

**TM 9-1240-416-13&P**

**OPERATOR AND FIELD MAINTENANCE MANUAL  
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST  
FOR THE  
M150**

**SIGHT, RIFLE COMBAT OPTIC (RCO)  
(NSN: 1240-01-557-1897)**



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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**HEADQUARTERS, DEPARTMENT OF THE ARMY  
MARCH 2008**



## TM 9-1240-416-13&P

### WARNING SUMMARY

This section contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within this supplement.

#### FIRST AID

For first aid information, refer to FM 4-25.11. Refer to the label and/or material safety data sheet (MSDS), for first aid information on hazardous materials.

Fire extinguisher(s), first aid kit and eye wash/shower station should be close at hand (or easily accessible) in case of an emergency.

#### EXPLANATION OF SAFETY WARNING ICONS



PROJECTILE – projectile hazard symbol indicates extreme danger for personnel. Impact by projectile will cause injury or death.



LASER LIGHT - laser light hazard symbol indicates extreme danger for eyes from laser beams and reflections.

#### GENERAL SAFETY WARNINGS DESCRIPTIONS

##### WARNING



Before installing optic on a weapon, ensure the weapon is **CLEAR**. Remove the magazine, pull the charging handle fully to the rear, inspect the chamber, ensure the chamber is clear, release the charging handle, and place the selector on safe. Failure to do so may result in injury or death to personnel.

## TM 9-1240-416-13&P

### WARNING SUMMARY – Continued

#### WARNING



The RCO scopes are provided with Laser Eye Protection only when used with the included Killflash AGF1-ARD Laser Filter/ARD Combo Unit. The AGF1-ARD must be attached to the RCO scope at all times of use. Use of optics without the AGF1-ARD will result in eye damage if exposed to a laser beam. For personnel not issued a Killflash, SPECS-3 wavelength (Class 4)/ Ballistic Laser Eyewear Protection System (BLEPS) goggles will be issued, and are to be worn at all times when utilizing the optical scope. Use of optical scope without the BLEPS or Killflash, will result in eye damage if exposed to a laser beam. Personnel are required to utilize BLEPS or Killflash protection with this optical scope.

#### EXPLANATION OF HAZARDOUS MATERIALS ICONS



RADIATION - three circular wedges shows that the material emits radioactive energy and can injure human tissue.

#### HAZARDOUS MATERIALS DESCRIPTION

#### WARNING



TRITIUM GAS (H-3)

Tritium is a low energy beta emitter. This low energy beta particle cannot penetrate the intact Pyrex tube/vial. However, if the tube is broken, the tritium gas will dissipate, and outer surfaces of the device and surfaces in the near vicinity of the break may become contaminated. Because of the weak beta radiation, tritium is NOT measurable by the Geiger-Mueller counter used with most fielded radiac instruments and requires wipe testing to determine the level of contamination.

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WARNING



TRITIUM GAS (H-3)

Tritium gas (used to fill the Pyrex tubes) is not absorbed by the skin to any significant degree. Tritium water vapor on the other hand is readily absorbed through the skin. A small amount of tritium oxide (1-2 %) is also contained in the gas stream used to fill the Pyrex tubes. Unlike tritium gas, tritium oxide is readily absorbed by the body, both through inhalation and absorption through the skin. Tritiated water that enters the body is chemically identical to ordinary water and is distributed throughout the body, if absorbed. The most likely route of entry would be direct hand contact with the surface of a tritium contaminated surface (i.e., Sight, Rifle Combat Optic containing a broken Pyrex tube/vial).

The M150 (RCO 4x32) contains radioactive material for low-light illumination. The radiation source is Hydrogen-3, commonly known as Tritium. Tritium is an odorless, tasteless, colorless gas that reacts to the human body in the same manner as natural hydrogen. The human body does not easily retain hydrogen or Tritium as a gas. If the Tritium lamp in the M150 breaks follow the procedures on the following page. The M150 is regulated under an EXEMPT LICENSE from the United States Nuclear Regulatory Commission (NRC) held by Trijicon, Inc. Disassembly of the scope is prohibited except by Trijicon, Inc.

### HANDLING A DAMAGED M150 (exposed internals [broken], fire, or crushed)

**DO NOT** handle a damaged unit if you have open skin cuts or abrasions. Use latex or rubber gloves when handling a damaged or crushed M150. An inverted clear plastic bag may be used if gloves are not available. Place the damaged or crushed device and gloves in clear double plastic bags and seal it. Label the outside of the sealed clear double plastic bags with "Broken Tritium Devices - Do Not Open" and place it in a secured ventilated storage area. Wash your hands with nonabrasive soap and lukewarm water. Contact your unit radiation safety officer for proper disposition. **DO NOT** eat, drink, smoke, chew, or apply cosmetics in the presence of a damaged or crushed M150.

## TM 9-1240-416-13&P

### WARNING SUMMARY – Continued

WARNING



TRITIUM GAS (H-3)

When a tritium source breaks or is no longer illuminated, the local Radiation Safety Officer (RSO) must be notified, and the following actions must be taken under the direction of the RSO:

- (1) Anyone who may have touched or handled a damaged (broken and crushed) M150 should wash hands as soon as possible with non-abrasive soap and lukewarm water.
- (2) The device and latex/rubber gloves worn during the handling of a damaged (broken or crushed device must be immediately placed into clear double plastic bags. The outside of the sealed clear double plastic bags must be labeled "BROKEN TRITIUM DEVICE - DO NOT OPEN". Place it in a secured ventilated storage area.
- (3) Turn-in the broken source (device) to the unit or installation RSO for collection and transfer to Trijicon, Inc., who will accept all damaged RCO sights and will be responsible for the replacing, repair if under warranty or disposal of the optical sight. The RSO MUST contact Trijicon, Inc. for shipping instructions to: Trijicon, Inc., 49385 Shafer Ave., Wixom, MI 48393-0059. Telephone 1-800-338-0563 from 0900 to 1700 EST.
- (4) Broken tritium devices in contact with other adjacent surfaces (i.e., table, countertop) could cross contaminate those surfaces. The local RSO may take wipe tests of the area in question to assess extent of surface contamination.

**CHANGE  
NO. 1**

**HEADQUARTERS, DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 27 SEP 2008**

**TECHNICAL MANUAL  
OPERATOR AND FIELD MAINTENANCE MANUAL  
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M150**

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TM 9-1240-416-13&P, dated 18 March 2008, is changed as follows:

1. File this sheet in front of the manual for reference.
2. This change is a result of updated safety information.
3. New or updated text is indicated by a vertical bar in the outer margin of the page.
4. Added illustrations are indicated by a vertical bar adjacent to the figure number. Changed illustrations are indicated by a miniature pointing hand adjacent to the updated area and a vertical bar adjacent to the figure number.
5. Remove old pages and insert new pages as indicated below.

**Remove Pages**

a-d

A-B (LOEP)

1-5 thru 1-6

3-5 thru 3-6

3-13 thru 3-14

**Insert Pages**

a-d

A-B (LOEP)

1-5 thru 1-6

3-5 thru 3-6

3-13 thru 3-14



By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.  
*General, United States Army*  
*Chief of Staff*

Official:

A handwritten signature in black ink that reads "Joyce E. Morrow". The signature is written in a cursive, flowing style.

JOYCE E. MORROW  
*Administrative Assistant to the*  
*Secretary of the Army*

0824106

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## TM 9-1240-416-13&P

### LIST OF EFFECTIVE PAGES

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Page No.	Change No.	Page No.	Change No.
Cover	0		
Warnings a-d	1		
i-vii/viii blank	0		
1-1 thru 1-4	0		
1-5 thru 1-6	1		
1-7 thru 1-30	0		
2-1 thru 2-11/2-12 blank	0		
3-1 thru 3-4	0		
3-5 thru 3-6	1		
3-7 thru 3-12	0		
3-13 thru 3-14	1		
3-15 thru 3-23/3-24 blank	0		
4-1 thru 4-7/4-8 blank	0		
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B-1 thru B-2	0		



**TM 9-1240-416-13&P**

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DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 18 MARCH 2008**

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You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. ARMY: Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeprs.ria.army.mil>. The DA Form 2028 is located under the Public Applications section in the AEPS Public Home Page. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or E-mail your letter or DA Form 2028 direct to: U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LC-LMPP/ TECH PUBS, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is ROCK-TACOM-TECH-PUBS@conus.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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## **CHAPTER 1: Technical**

### **INTRODUCTION**

The M150 is an Advanced Combat Optical Gunsight (RCO) designed for the M4, M16A2, M16A4, and M249 SAW Machine Gun in Automatic Rifle (AR) role. It provides the shooter with quick target acquisition at close combat ranges while providing enhanced target identification and hit probability out to 800 meters utilizing the Bullet Drop Compensator (BDC). The M150 incorporates dual-illumination technology using a combination of fiber optics and self-luminous Tritium. This allows the aiming point to be always illuminated without the use of batteries. The Tritium illuminates the aiming point in total darkness, and the fiber-optic self-adjusts reticle brightness during daylight according to ambient light conditions. This allows the operator to keep both eyes open while engaging targets and maintaining maximum situational awareness.

### **DESCRIPTION**

The M150 Sight, Rifle Combat Optic (Figure 1) is designed to provide enhanced target identification and hit probability for the M4, M16A2, M16A4, and M249 in AR role out to 800 meters. Although it is designed primarily for use during the day, it has a tritium-illuminated reticle for night and low-light use. The M150 Sight, Rifle Combat Optic is a lightweight, rugged, fast and accurate 4-power optical scope. The body is machined from aluminum forgings; both the material and finish are identical to that of the M16A2/M16A4/M4 Rifle/Carbine and M249 SAW Machine Gun (AR). The scope is internally adjustable to allow the shock from rough handling to be carried by the scope body and not the adjustment mechanism. A Killflash AGF1-ARD Laser Filter/Anti-Reflection Device (LARD) Combo Unit (NSN 1240-01-540-2890) is included with the M150 Sight, Rifle Combat Optic. The Killflash Combo Unit is constructed of a glass-composite material of identical finish to the M16A2/M16A4/M4 Rifle/Carbine and M249 Machine Gun (AR). The Killflash Combo Unit is fixed to the scope using an included rubber strap.

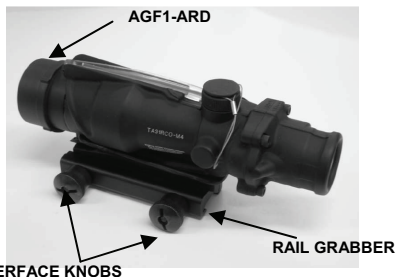


Figure 1

## CHARACTERISTICS

Objective Lens	32 mm
Magnification	4 power
Eye Relief	1.5 in (38.1mm)
Exit Pupil	8mm
Field of View	7 degrees/36.8 ft @ 100 yds./12.3m @ 100m
Length	7.8 in
Weight	1.004 lb.
Waterproof	66 ft
Tritium	0.1 curies

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### MAJOR COMPONENTS

M150 Sight, Rifle Combat Optic

NSN 1240-01-534-1114

Killflash AGF1-ARD Laser

Filter/Anti-Reflection Device (LARD)

NSN 1240-01-540-2890

MIL-STD 1913 rail Interface (TA51 Mount)

NSN 1240-01-527-7101

Carry handle mount (TA54A Screw)

NSN 5305-01-559-3863

Lens Pen

NSN 1240-01-535-0972

Soft Case, MOLLE

NSN 1240-01-535-4485

**CONTROLS AND INDICATORS**

Figure 1 identifies the external controls and indicators of the M150 Rifle Combat Optic.





## PREPARATION FOR USE

### M150 Inspection

WARNING



TRITIUM GAS

The M150 (RCO 4x32) contains radioactive material for low-light illumination. The radiation source is Hydrogen-3, commonly known as Tritium. Tritium is an odorless, tasteless, colorless gas that reacts to the human body in the same manner as natural hydrogen. The human body does not easily retain hydrogen or Tritium as a gas. If the Tritium lamp in the M150 breaks follow the procedures on the following page. The M150 is regulated under an EXEMPT LICENSE from the United States Nuclear Regulatory Commission (NRC) held by Trijicon, Inc. Disassembly of the scope is prohibited except by Trijicon, Inc.

It is recommended that the Tritium lamps be checked (for proper operation, illumination and/or damage) prior to deployment (before removal from the storage area) of the optic, twice during any exercise, before placing it back into the storage area and every 6 months or immediately following any incident which might lead to lamp failure such as the dropping of the M150 onto a hard surface.

To determine that the Tritium lamp is functioning in either optic, enter a dark room and look through the optic. The Chevron should be illuminated red as shown in Figure 18. The illumination provided by the Tritium lamp is very faint and will be hard to see without a dark-adapted eye. Remain in the dark room for approximately 10 minutes to adapt your eyes to the dark.

The reticle is illuminated in low light or complete darkness. When tritium lamp shows no luminosity, double bag the M150 in clear plastic bags and mark the outside of the sealed bag with "BROKEN TRITIUM DEVICE - DO NOT OPEN". Place it in a secured ventilated storage area. Wash your hands with nonabrasive soap and lukewarm water, and contact your unit radiation safety officer (RSO) for disposition.

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### IDENTIFICATION MARKINGS

Figure 3 identifies all external identification markings. They are laser etched on the left side of the main body.

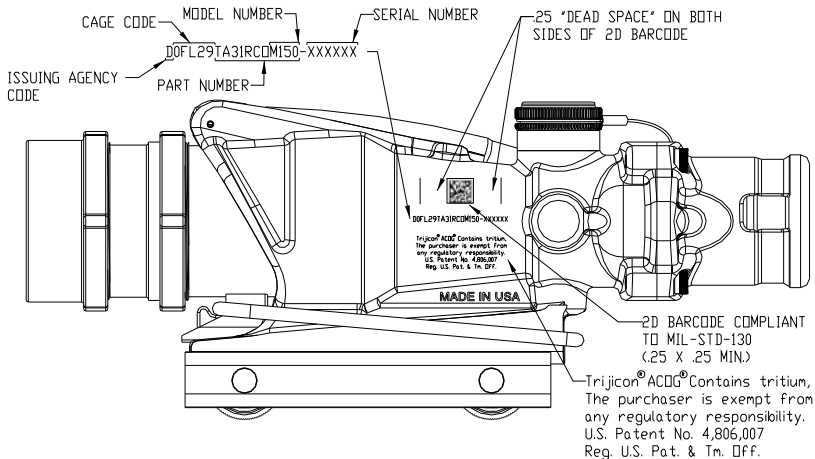
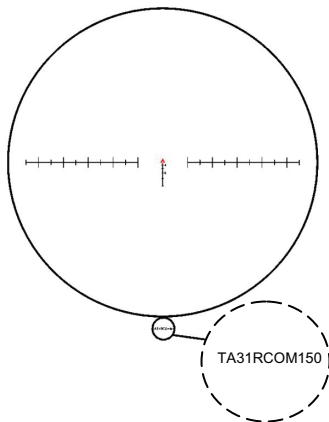


Figure 3

**INTERNAL IDENTIFICATION**

To further assist in identification, the manufacturer's model will be noted at the bottom of the Field of View when looking into the optic as identified in Figure 4.



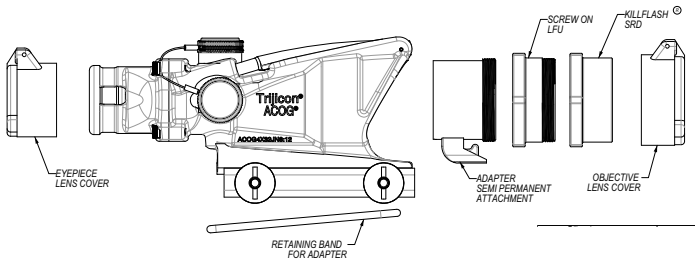
**Figure 4**

**INSTALLATION OF THE LASER FILTER UNIT (LFU) AND ANTI-REFLECTION DEVICE (ARD)**

**NOTE**

Do Not use Thread Locking Compound on Threads on LFU/ARD components.

1. Slide Eyepiece lens cover over eye piece
2. Slide Adapter Semi permanent into Objective housing
3. Slide Retaining band around the base of the RCO and the slide adapter foot (see figure 10).
4. Screw on LFU then ARD
5. Slide Objective lens cover onto ARD



**Figure 5**

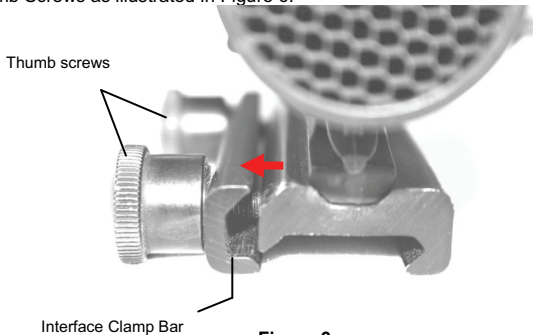
**INSTALLATION PROCEDURES SIGHT MOUNT (M4, M4A1, M16A4, and M249 SAW AR)**

**WARNING**



Before installing optic on a weapon, ensure the weapon is CLEAR. Remove the magazine, pull the charging handle fully to the rear, inspect the chamber, ensure the chamber is clear, release the charging handle, and place the selector on safe. Failure to do so may result in injury or death to personnel.

The M150 is easily attached to the M4, M4A1, M16A4, and M249 SAW AR flattop receiver Sight Mount. Prior to attempting to mount the optic, loosen the Thumb Screws and pull the Interface Clamp Bar back against the Thumb Screws as illustrated in Figure 6.



**Figure 6**

### TM 9-1240-416-13&P

Place the M150 onto the flattop receiver rail. Be sure to align the Interface Studs located on the bottom of the adapter with the grooves on the Sight Mount of the flattop receiver as illustrated in Figure 7.

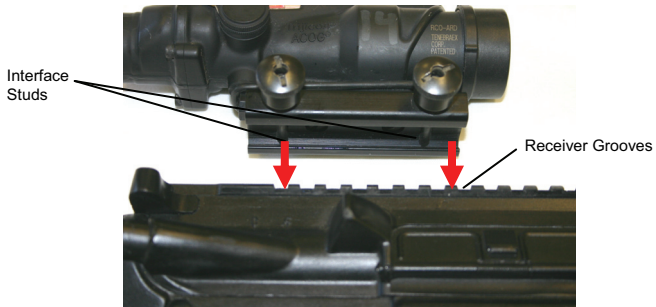


Figure 7

## TM 9-1240-416-13&P

### CAUTION

DO NOT tighten beyond the recommended method (below). Installing the M150 in the same position on the flattop rail and using the same torque on the Thumb Screws will ensure maximum zero retention. To replicate the same torque setting, tighten using the recommended method and mark the Thumb Screws and Interface Bar Clamp (figure 8) with indelible marker or other semi permanent means.

The M150 can be placed in any of the slots on top of the receiver to allow for eye relief adjustment. Once the ideal position has been determined, apply forward pressure on the optic and tighten the knobs firmly using finger pressure only. Then, add another 1/4 turn utilizing a coin or a bladed screwdriver.



Figure 8

**INSTALLING THE M150 ON THE M16A2 CARRYING HANDLE**

**WARNING**



Before installing optic on a weapon, ensure the weapon is CLEAR. Remove the magazine, pull the charging handle fully to the rear, inspect the chamber, ensure the chamber is clear, release the charging handle, and place the selector on safe. Failure to do so may result in injury or death to personnel.

**NOTE**

Prior to installing the RCO on a carrying handle, remove the Sight Mount from the RCO.

1. Refer to Chapter 3, Removal of Mount Assembly.
2. Once the Sight Mount is removed, make sure the LFU/ARD Retaining Band is up around the M150 housing. Align the M150 forward mounting hole with the carrying handle mounting hole (see arrows in Figure 9). The forward mounting hole provides proper eye relief. Once proper alignment is established, seat the M150 completely into the carrying handle channel ensuring hole alignment is retained. Seating the optic into the carrying handle channel may require substantial pressure. Use direct pressure only. Do not use impact.



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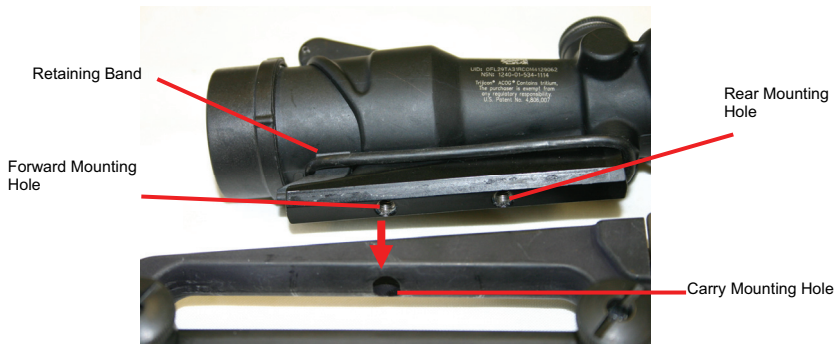


Figure 9

### **CAUTION**

Alignment is crucial. DO NOT force the screw set into the threaded hole of the optic. Damage will occur to the special threads. If resistance is met, check optic/carrying handle alignment and try again.

- Using the Thumbscrew assembly, as shown in Figure 11, begin to thread the screw set into the M150 through the bottom of the carrying handle as identified in Figure 10.

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Figure 10



Figure 11

## TM 9-1240-416-13&P

- The special washer should be placed on the Thumb Screw after the lock washer so that the U shape fits under the handle against the curved surface as illustrated in Figure 12. Figure 13 illustrates incorrect Thumbscrew special washer alignment.

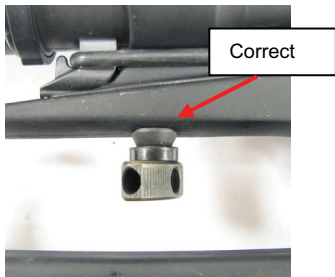


Figure 12

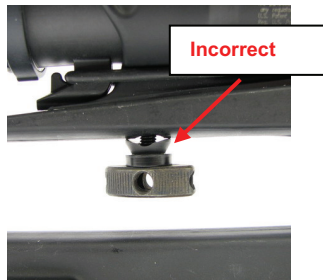


Figure 13

- If the RCO fits loosely into the carry handle, skip directly to step 8. Use both hands to squeeze the top of the RCO and the bottom of the carry handle to further seat the RCO.
- Firmly press or tap the top of the RCO eyepiece downward with the palm of your hand. Repeat until it is fully seated in the carry handle. See **figure 14**.
- Finger-tighten the thumbscrew again.
- Use a section of cleaning rod and insert it into the thumbscrew through holes up to the middle of the rod. This is to prevent damage to the threaded ends on both sides. See **figure 14**.

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9. Tighten the thumbscrew one full turn. Apply even pressure to both ends of the cleaning rod.
10. Visually inspect both ends of the RCO mount rail to ensure it is fully seated. The angled surfaces of the RCO mount rail and carry handle should be in full contact. A flashlight may be necessary to inspect the eyepiece and objective end for an air gap.



Figure 14

## **ADJUSTMENT PROCEDURES**

The M150 is internally adjustable. The adjusters need only position the internal roof prism. For this reason, a light tap on the adjusters, after an adjustment has been made, will ensure proper seating of the internal mechanism and allow for an accurate zero. If a light tap to the adjuster is not applied, the first round fired may be inaccurate.

The M150 is shipped with a factory centered position for the M4, M4A1, M16A4, AND M249 IN AR ROLE weapon. Normally this means that only small adjustments are necessary. Do not adjust the RCO Scope to the extremes. It is possible that over-adjustment will damage the precise alignment of the prism assembly inside the RCO Scope.

### **ADJUSTMENT CAUTION**

As the limits of the windage and elevation adjustments are reached, the adjustment mechanism will become more and more difficult to adjust. Adjust further only with caution. If the adjustment mechanism is adjusted past this point, it may break.

Adjustment beyond the center of the windage and elevation adjustment range should not be necessary. If it seems that you need more adjustment than is available, please consult with your Service Command Technical Point of Contact.

The M150 Sight, Rifle Combat Optic contains an internal adjustment mechanism to allow zeroing on the M16A4/M4 Rifle/Carbine, M249 SAW. Adjustment to the extreme ends of the range can result in damage to the internal prism assembly. Do not continue to adjust windage and elevation mechanisms if you encounter resistance.

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The M150 Sight, Rifle Combat Optic is carefully adjusted at the factory so that there is no parallax at the center of the field or in the aiming areas. This results in some vertical parallax away from the center. This in no way affects the accuracy of the RCO Scope.

The reticle pattern in the M150 Sight, Rifle Combat Optic has been carefully designed to provide many features while retaining simplicity of operation. The user does not need to make any manual adjustments between shots at different ranges. Ranging capability is built into the reticle pattern, which is parallax free along its vertical axis.

The widths of the horizontal hash marks correspond to the width of a .5 meters (19 inches) silhouette (man-size) at that range. The crosshair lines for the 100 to 300 meter (108 to 324 yds) ranges are illuminated at night.

## ADJUSTER CAPS

### **CAUTION**

Damage may occur to the cap or the threads of the adjuster housing if the cap does not make contact with the main housing when the cap is exposed to impact.

### **CAUTION**

The Sight, Rifle Combat Optic is waterproof only when the elevation and windage caps are firmly screwed onto the RCO Scope. Take care not to apply undue pressure when installing the adjustment caps, as they may become difficult to remove if tightened excessively. Be sure the O-rings are in place and undamaged.

The adjuster caps, identified in Figure 15, must be tightened until the adjuster cap makes contact with the M150 main housing. This should be accomplished with fingers only. This will prevent possible damage to the cap or the adjuster housing threads. No use of tools is required to tighten the caps.

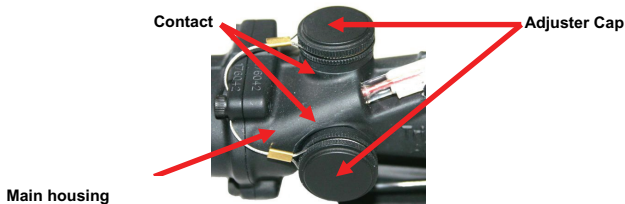


Figure 15

### Elevation Adjustment

Remove the **top** adjuster cap to expose the elevation adjuster (Figure 16). Moving the adjuster in the direction of the arrow (clockwise) will move the strike of the bullet **UP** as indicated on the adjuster. The amount of clicks can be detected through audible and tactile feedback.



Figure 16

### Windage Adjustment

Remove the **side** adjuster cap to expose the windage adjuster (Figure 17). Moving the adjuster in the direction of the arrow (clockwise) will move the strike of the bullet **RIGHT** as indicated on the adjuster. The amount of clicks can be detected through audible and physical feedback.



Figure 17

**Tap the adjusters after each adjustment to ensure the internal mechanism is fully seated.**



**ZEROING PROCEDURES RIFLE/CARBINE**

**M4/M16A4/M16A2**

**NOTE**

The LBS (TM 9-5860-226-13&P) may be used to transfer zero to the weapon/sight combinations identically configured to a master weapon. See Offsets in Appendix A.

M4/M16A4: The M150 RCO is zeroed after the installation and zeroing of the Back Up Iron Sight (BUIS). The M150 RCO CANNOT be zeroed through the BUIS, and the BUIS can NOT be employed through the ACOG.

For M4/M16A4 an offset is used on the M16 zero target of 1.5 blocks lower offset point with a 4cm box outlined around that point and shaded for a designated strike zone.

For a M16A2 an offset is used on the M16 zero target of 4.0 blocks lower offset point with a 4cm box outlined around that point and shaded for a designated strike zone

1. The M150 RCO when installed on a M4/M16A4/M16A2 is zeroed on a standard M16 Zero target with an alternate strike points (see NOTES above) using established procedures in FM-3-22.9 paragraph 5-2.

**NOTE**

At 25 Meters 3 clicks moves the bullet impact approximately one square on the M16 zero target.

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- In the zeroing process, groups of three single shot rounds are fired at a standard M16 zero target. After each three rounds, the center of the group is determined and adjustments to windage and elevation are made until center of the group is within the designated strike zone.
- Aiming Point. At 25m, the point of the aim using the tip of the 300 meter aiming point is center mass (See figure 18)



Figure 18

## ZEROING PROCEDURES M249 SERIES MACHINE GUN

### M249 10m Range Zeroing

#### **NOTE**

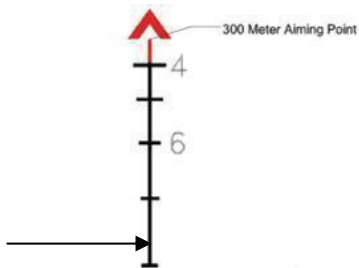
The LBS (TM 9-5860-226-13&P) may be used to transfer zero to the weapon/sight combinations identically configured to a master weapon. See Offsets in Appendix A.

1. Look through the M150 optic and align the appropriate horizontal stadia line, 750 meter (Short Barrel) 800 meter (Long Barrel) line on the center base of the aiming points on the basic machine gun marksmanship target.

#### **NOTE**

Since there is no 750 meter stadia line present on the M150 reticle, when zeroing a M249 AR (Short Barrel) use the space between the 700 and 800 meter stadia lines when firing the 10 meter exercise.

**TM 9-1240-416-13&P**



**Figure 19.**

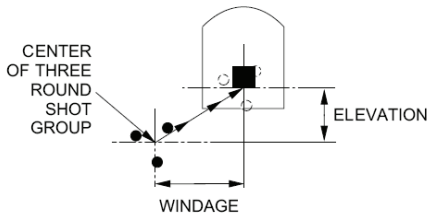
2. Fire three single rounds loaded individually without making any optic adjustments.

**NOTE**

In the zeroing process, groups of three single shot rounds are fired at a standard machinegun zero target. After each three rounds, the center of the group has to be determined.

3. The three round shot group should be within a 4cm circle to establish the center of shot group in relation to the center base of the aiming paster.

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**Figure 20**

4. Measure the amount of movement required left or right (windage) and up or down (elevation) to move the three round shot group onto the center of the aiming poster.
5. Windage/Elevation correction: Make corrections to the M150 and re-fire groups of three single shot rounds to confirm zero.

### **NOTE**

Each click of zeroing adjustments makes a 1 mm movement of the point of impact at 10 meters.

6. Repeat steps 1 through 5 until the strike of the round is in the center of the target. Once the rounds are in the center of the target the M150 is 10 meter zeroed.

**FIELD ZERO AT 500M RANGE**

1. Look through the optic and align the reticle's 500m mark on the center of mass of the double "E" silhouette target.
2. Fire a fire a 5 to 7 round burst.
3. Observe impact of rounds.
4. Determine direction of movement needed for impact (up or down, left or right).
5. Estimate or measure the amount of movement required to move the strike of the round to the center of the target (at 500 meters, one click of adjustment in both windage and elevation equals 2.5 in. at 500 meter).
6. Repeat steps 1 through 6 until the strike of the round is coincident with the center of the target.

**THE BULLET DROP COMPENSATOR (BDC)**

The entire reticle pattern is a Bullet Drop Compensator, designed to compensate for the trajectory of the 5.56mm round from 100-800 meters without making mechanical adjustments to the sight. When zeroed properly, the Point of Aim/Point of Impact at the designated distance is shown below in Figure 21.

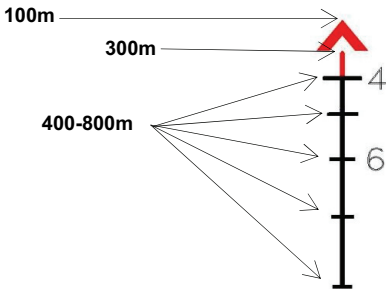


Figure 21

**RANGING FEATURE**

The base of the Chevron and the horizontal stadia lines below the chevron represent 19" at the indicated range (19" is the average width of a man's shoulders). Range your target using the base of the chevron for 300m and the width of the horizontal stadia lines for 400-800m as identified in Figure 22.

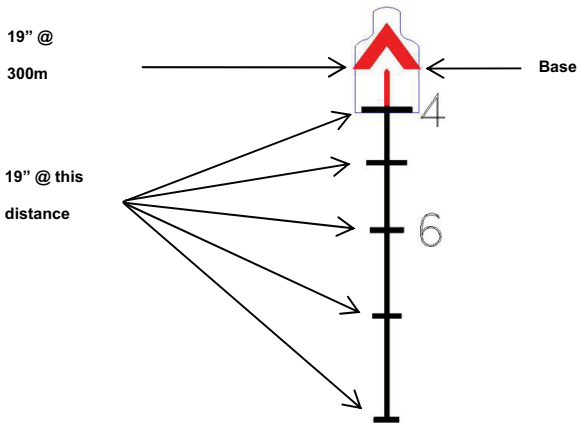


Figure 22



### TM 9-1240-416-13&P

Beyond 300m, determine which stadia line best fits the target's shoulders and use that 'crosshair' as your Point of Aim. Because the BDC is calibrated for the correct trajectory, your Point of Aim is your Point of Impact at each distance. Figure 23 illustrates proper sight picture at each distance.

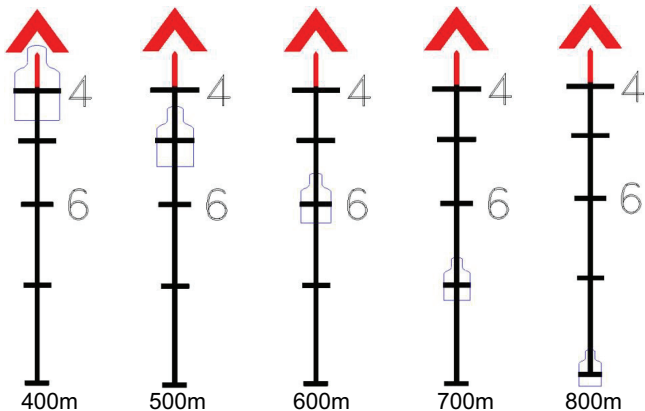
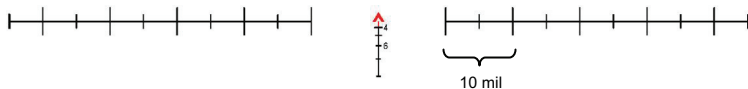


Figure 23

**M150 TARGET REFERENCE SYSTEM**



**Figure 24**

**NOTE**

The right side of the horizontal mil-scale will appear out of focus. This is normal.

The M150 reticle includes a horizontal mil-scale graduated in 5 mil increments as seen in Figure 24. The distance from the center post to the first mil-bar is 10 mils left side and 10 mils right side. Due to the design of the optic, the right side of the mil scale will become blurry. This is normal.

The horizontal mil-scale is primarily used for communicating target positions and other relationships to team members within the small unit.

## **CHAPTER 2: Operation and Use**

### **QUICK TARGET ACQUISITION FROM 0-300 METERS**

The M150 is designed to be utilized with BOTH eyes OPEN from muzzle to 300 meters, providing quick target acquisition and engagement when needed. This allows the M150 to be utilized as a reflexive sight when speed is critical. Train yourself to:

- Keep BOTH eyes OPEN
- Focus on the target
- Bring the weapon/optic up into your line of sight
  - Do not switch focus to the reticle
- Assess and engage when warranted

At extreme close ranges, where time is critical to survival, keep BOTH eyes OPEN, put RED on target, and engage. Do not take the time to obtain a full field of view, center the chevron, or identify the shape of the chevron. Simply put RED on target and squeeze the trigger. At this speed no magnification is noticed until after firing.

As the distance between you and the target increases, so should the time taken to engage more accurately. The Both Eyes Open shooting technique can be used very effectively from muzzle to 300 meters when needed (immediate threat). This is why the chevron is illuminated to 300 meters.

### **The Bindon Aiming Concept (BAC)**

The BAC feature allows the shooter to track and engage moving targets quickly.

Utilizing the Both Eyes Open aiming method, when the weapon is being moved, the image as seen through the M150 with your shooting eye blurs much quicker than the view from your non-shooting eye (because it is magnified 4x). The brain chooses the non-blurry view from the non-shooting eye automatically (switches focus). As soon as you are close to the proper aim on target, weapon movement slows, the blur ceases, and your brain instantly selects the greater detail of the magnified view.

This means when the weapon is moving to the target you will not notice any magnification. All you will see is the illuminated chevron in the target area, like a reflexive sight. Once you slow the weapon on the target, the target will 'Zoom' in at 4x, allowing you to identify and engage more accurately if necessary.

This aiming concept happens naturally (without conscious thought) for those with equal or close to equal vision in both eyes. It takes practice keeping BOTH eyes OPEN and focusing on your target.

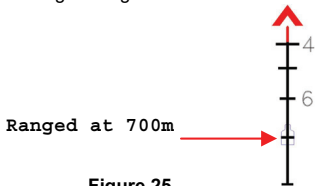
## TM 9-1240-416-13&P

### SHOOTING 400-800 METERS (Traditional Marksmanship)

#### **NOTE**

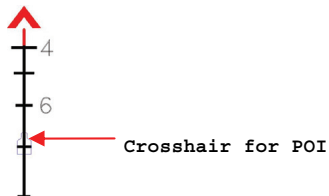
To engage targets from 400-800m: Seek a supported position (if possible), close your non-shooting eye and raise the ranging reticle until one of the horizontal lines fits the shoulders of the intended target.

Beyond 300 meters the M150 provides a ranging reticle that will allow the shooter to place well-aimed accurate hits on target using *traditional marksmanship skills*.



**Figure 25**

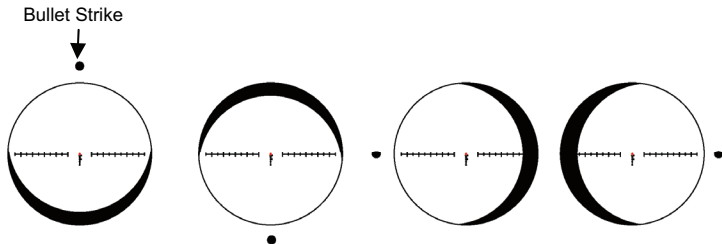
Use that 'Crosshair' reticle pattern to identify your Point of Aim. This also becomes your Point of Impact (Figure 26).



**Figure 26**

## TM 9-1240-416-13&P

Ensure you have a FULL Field of View (FOV) and proper Sight Alignment (no shadow). Improper FOV or Sight Alignment (shadow) will result in improper shot placement. To acquire the proper FOV, move your shooting eye closer or further from the eyepiece until you have no shadow on the outer most portion of the optic's view. To acquire proper Sight Alignment, move your shooting eye vertically and horizontally until no shadow exists. Figure 27 illustrates incorrect bullet strikes based on existing shadow.



**Figure 27**

Focus on the reticle to acquire the necessary precision aim.

Apply a smooth trigger squeeze so as to not disturb your sight alignment and/or aiming point.

Follow through. Do not release the trigger, move your eye from your aiming point, or otherwise disturb your position. Identify your impact by maintaining a visual on your target. If the round struck your target, determine if another follow up shot is required. If the round did not strike your target, adjust your Point of Aim and repeat.

**TRANSITIONAL SHOOTING**

Transitional shooting is utilized when the shooter must engage targets at varying distances (based on actual or perceived threat) within a short period of time. This will require the shooter to transition from Speed to Traditional Marksmanship quickly and effectively. The mental transition must be made from speed to accuracy and vice versa as target priorities change. Constantly accessing your environment and possible threats within that environment will assist in prioritizing targets based on distance, weapon, and abilities.

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### SHOOTING WITH WIND

Wind will have a significant affect on the 5.56mm round's POI beyond 100 meters. Aim to the opposite direction of the wind and watch for impacts. Adjust accordingly. Figure 28 below illustrates the proper reticle position to acquire a torso hit at various distances and wind strengths.

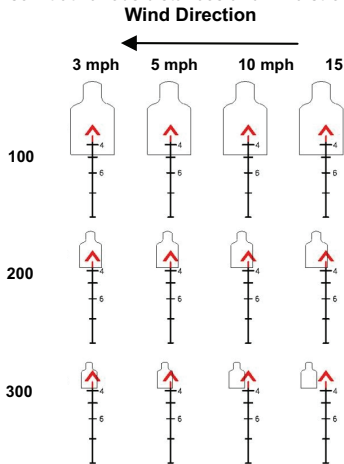


Figure 28



### SHOOTING AT VERTICAL ANGLES

For ranges out to 400 meters and using a properly zeroed M150, putting the chevron on center mass of the target, regardless of angle, will result in a hit on the target. This is quick and easy to remember especially in urban terrain or when speed shooting is critical.

For ranges beyond 400 meters, aim low on your target using the appropriate stadia line for that distance and watch for impacts.

### SHOOTING AT MOVING TARGETS

Shooting a moving target at close ranges (approximately 50m and closer) requires the shooter to keep BOTH eyes open (BAC) and 'track' the target from behind until the chevron is at the leading edge of the torso as seen in Figure 29. Continue to maintain that lead as you squeeze the trigger. Repeat if necessary.

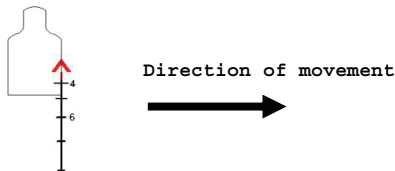


Figure 29

Shooting at moving targets beyond 50m utilizes the same lead concept as iron sights. At longer distances the shooter must take into consideration the speed of the target, angle of the target's movement, range to target, and wind. Figure 30, on the following page illustrates leads based on a target at a known distance and speed moving 90 degrees to the shooter. Watch for bullet impact and adjust accordingly.

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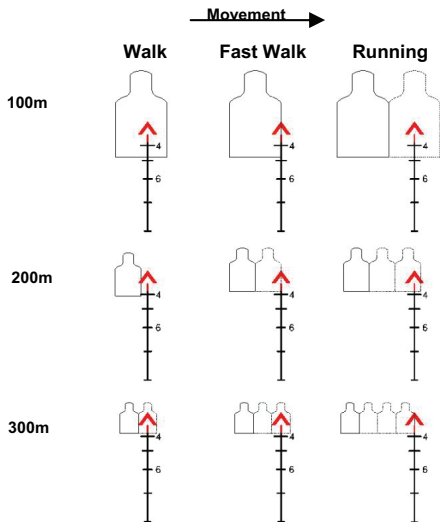


Figure 30

**M249 SAW CAPABILITY**

**NOTE**

The continuous recoil of the SAW may loosen the optic after time.

The M150 can be used on the M249 SAW. It will provide the same quick target acquisition from muzzle to 300m and the Bullet Drop Compensator will retain accuracy out to its 800m maximum.

Check the Thumb Screws often to ensure the optic is securely mounted.

**FIELD CRAFT**

To adjust reticle illumination during extremely bright conditions, use riggers' tape as seen in Figure 31 to shield the fiber optic collector. During bright conditions only about 1/2 - 1 inch of fiber optic is required to illuminate the reticle. As more reticle illumination is needed, peel back the tape to expose more fiber optic.



**Figure 31**

To add additional illumination to the reticle during transitional light conditions or twilight, apply 1 or 2 Cyalume sticks (1.5 inch) as seen in Figure 32 to the riggers tape and seal around the fiber optic.



**Figure 32**

**STORAGE:**

The RCO should be stored separately from the weapon:

1. Note the serial number of the matched weapon and optic and the location of optic on rail. Returning the same optic to the same weapon in the same slot on mounting rail will enable weapon and optic to retain zero.
2. Remove optic from weapon.
3. Store optic in a separate locked cabinet, preferably in the arms room.

**SHIPPING:**

For return to manufacturer, turn in RCO according to instructions on page 3-14, Repair of M150.



**CHAPTER 3: Operator and Field Maintenance**

**TROUBLESHOOTING**

**GENERAL**

Tables 1 and 2 list common malfunctions that you may find with your RCO. Perform the tests, inspections, and corrective actions in the order they appear in the table.

Tables 1 and 2 cannot list all of the malfunctions that may occur, all of the tests and inspections needed to find the fault, or all of the corrective actions needed to correct the fault. If the equipment malfunction is not listed or the actions listed do not correct the fault, notify your armorer.

**TABLE 1. OPERATOR TROUBLESHOOTING PROCEDURES**

<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
1. RCO Does not maintain zero.		Evacuate to Field Maintenance.
2. Tritium lamp does not glow.		Evacuate to Field Maintenance.

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### TABLE 2. FIELD TROUBLESHOOTING PROCEDURES

<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
1. RCO Does not maintain zero.	Check mount for tightness of knobs and screws.	If knobs and/or screws are loose, tighten as appropriate. If RCO mount is not loose and RCO still does not maintain zero, contact manufacturer and return RCO for repairs as directed (see Repair of M150, pg. 3-14)
2. Tritium lamp does not glow.		Turn RCO into RSO for return to manufacturer.

## PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

### GENERAL

Preventive Maintenance Checks and Services (PMCS) are performed to keep the equipment in operating condition. The checks are used to find, correct, or report problems. PMCS's are done every day the equipment is used. Pay attention to WARNING and CAUTION statements. A WARNING means someone could be hurt. A CAUTION means equipment could be damaged.

- 1. Before You Operate.** Perform your Before PMCS.
- 2. During Operation.** Perform your During PMCS.
- 3. After Operation.** Perform your After PMCS.



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- 4. If Your Equipment Fails to Operate.** Troubleshoot. Report any deficiencies using the proper form, see DA PAM 750-8. If you cannot correct it yourself, notify your armorer.

### EXPLANATION OF COLUMNS

The PMCS Table 3 lists those required checks and services to be performed by personnel who use the M150, Rifle Combat Optic. The table is divided as follows:

- 1. ITEM NUMBER Column:** Checks and services are numbered in disassembly sequence. This column shall be used as a source of item numbers for the "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.
- 2. INTERVAL Column:** This column gives the designated interval when each check is to be performed.
- 3. ITEM TO BE CHECKED OR SERVICED Column:** This column lists the items to be checked or serviced.
- 4. PROCEDURE Column:** This column contains a brief description of the procedure by which the check is to be performed. It contains all the information required to accomplish the checks and services.
- 5. NOT FULLY MISSION CAPABLE IF Column:** This column contains a brief statement of the condition (e.g., malfunction, shortage) that would cause the covered equipment to be less than fully ready to perform its assigned mission.

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**TABLE 3. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)**

<b>ITEM NO.</b>	<b>INTERVAL</b>	<b>ITEM TO BE CHECKED OR SERVICED</b>	<b>PROCEDURE</b>	<b>NOT FULLY MISSION CAPABLE IF:</b>
1.	Before During After	XM150 RCO	Look through the RCO. Inspect for visual obstruction of target image, dust, dirt, pits, or moisture on optical surfaces, lose or broken optical elements.	These conditions are present and cannot be corrected by cleaning.
2.	Before After	Tritium Lamp	Take the RCO into a dark room and look through it. Verify that the center area between the crosshairs is illuminated by an amber glow. See Tritium Failure Inspection (pg. 3-6).	Tritium lamp does not appear to glow.
3	Before After	Adjustment Cap Assembly	Inspect for missing components (i.e., adjustment caps, lanyard, eyepiece bolt).	Adjustment cap assembly is missing.
4.	Before After	Objective Lens and Eye Piece Lens Flip Covers	Inspect for missing or damaged flip covers. *SH—Flip covers are missing or damaged.	

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<b>ITEM NO.</b>	<b>INTERVAL</b>	<b>ITEM TO BE CHECKED OR SERVICED</b>	<b>PROCEDURE</b>	<b>NOT FULLY MISSION CAPABLE IF:</b>
5.	Before After	Objective Lens and Eye Piece Lens	Inspect for cracked or damaged lenses.	Lenses cracked or damaged.
6	Before After	LFU/ARD	Inspect for visual obstruction of target image, dust, dirt, or moisture on the LFU/ARD, missing, loose or broken LFU and/or ARD, and/or missing, loose or broken retaining band.  *SH—If these conditions are present and cannot be corrected by cleaning.	
7.	Before After	Windage and Elevation Adjustment Knobs	Check each knob for an audible click. Make only one or two click turns on each knob and return to original position to retain zero.	No audible click when turning knob.
8.	Before After	Mounting Hardware	Check to for missing, broken, or loose mounting hardware.	Mounting hardware is missing, broken, or loose.

\*SH—This code indicates that the stated condition is a SHORTCOMING to the RCO, but that the condition does not make the RCO not fully mission capable.

**OPERATOR MAINTENANCE**

**TRITIUM FAILURE INSPECTION**

**WARNING**



**TRITIUM GAS (H-3)**

1. Check (proper operation, illumination and/or damage) the tritium lamps for failure, prior to deployment (before removal from the storage area) of the optic, twice during any exercise, before placing it back into the storage area and every 6 months or immediately following any incident which might lead to lamp failure such as the dropping of the M150 onto a hard surface.
2. To determine if the lamp is functioning, take the RCO Scope into a dark room and look through it. The illumination provided by the tritium is very faint and will be hard to see initially. Remain in the dark room for several minutes until your eyes adjust to the darkness. Focus on the center of the reticle pattern. The center area between the crosshairs should be illuminated by an amber glow.
3. If the tritium lamp does not appear to glow, place the unit in two clear sealed plastic bags and label the exterior of the sealed bag with "BROKEN TRITIUM DEVICE - DO NOT OPEN". Place it in a secured ventilated storage area. Wash your hands with nonabrasive soap and lukewarm water, and contact your unit radiation safety officer (RSO) for disposition.
4. If during operations, the inside surface of a lens becomes fogged, the M150 RCO Optical Scope is no longer sealed.

## CLEANING

### **CAUTION**

DO NOT allow the light collector tube of the M150 (Figure 2) to come into contact with harsh organic chemicals such as Acetone, Trichloroethane, or other cleaning solvents. They will affect the appearance of the light collector tube though they will not affect its performance.

The M150 requires very little maintenance. If the lenses become dirty, wash using fresh water and a soft clean cloth. Be sure to wash the lenses fully before wiping them with a soft cloth. The lenses can be scratched if dirt is pulled along the lens by the cloth. The outside lens may fog over in cold weather. Remove fog by using a dry, clean soft cloth.

Anti-fog solutions can be applied to the exterior of the lenses to help prevent fogging during temperature changes.

### Using the LENS PEN



Figure 33

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### CAUTION

Remove all foreign material from the lenses before cleaning them with the lens pen. This will prevent damage to the lenses.

Repair or maintenance other than that described in this manual is prohibited by anyone other than the manufacturer because of the radioactive material contained in the M150.

To clean the M150 utilizing the LENS PEN (Figure 33):

1. Depress and push forward the Lens Brush Slider, exposing the Lens Brush. Use this brush to remove all foreign material from the unit if fresh water is not available. Pay special attention to the lenses.
2. Remove the cap from the opposite end of the LENS PEN to expose the Felt Lens Cleaner.
3. Ensure there is NO foreign material on the felt surface.
4. Starting in the center of the lens, press the felt surface of the lens cleaner against the lens and in a spiral motion, work from the center to the outside edge of the lens. Repeat if necessary.
5. When finished, depress Lens Brush Slider and retract the brush into the LENS PEN. Replace the cap over the Felt Lens Cleaner as seen in Figure 34.



Figure 34

**Cleaning the Laser Filter Unit and Anti-Reflection Device**

**CAUTION**

NEVER use thread locking compound when screwing the plastic honeycomb (Anti-Reflection Device) housing back onto the modular assembly.

Treat the LFU/ARD (Figure 35) with the same care you would any optical surface.

To clear snow or water from the LFU/ARD when it is mounted, blow sharply into face of LFU/ARD near one edge. If clogged with dirt or mud, unscrew the LFU/ARD from the hook/O-Ring assembly and blow clean. If necessary, you can also run water through to clear it. Blow through the mesh to remove the water. Treat the LFU as you would the optical lens of the M150 see "Using the LENS PEN" page 3-7.

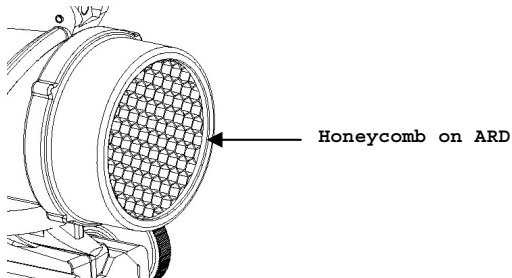


Figure 35

## **FIELD MAINTENANCE TASKS**

### **REMOVAL AND INSTALLATION OF SIGHT MOUNT ASSEMBLY**

Personnel Needed: One

Equipment/Tools Needed: Small Arms Tool Kit (5180-01-506-8287)

Materials Needed: Sealing Compound (8030-01-104-5392)

Equipment Conditions: RCO removed from weapon; LFU/ARD removed

#### **REMOVAL**

#### **NOTE**

Forward and Rear Mounting Holes have Helicoil inserts. If Helicoil inserts are loose, come out of the holes, or break, or if mounting screws will not tighten, the RCO must be returned to the manufacturer for repair (see Repair of M150, pg. 3-14)

Use a 1/4 inch head tip screwdriver to remove the screws.

1. The sight mount assembly is attached to the M150 Sight, Rifle Combat Optic by two pan head slotted bolts.
2. To remove the old bolts, use a flat head screwdriver with full engagement in the slot. These screws are very tight. Be careful not to strip the heads.
3. Keep bolts with sight mount assembly and store sight mount assembly in arms room for reinstallation if removing sight mount assembly to install RCO on M16A2 carrying handle.



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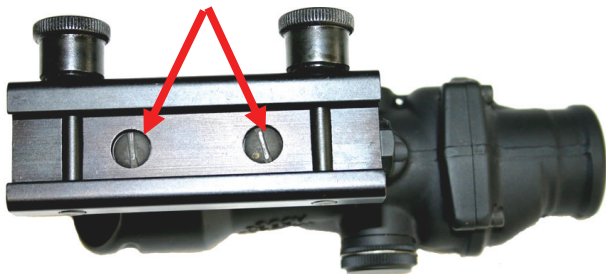


Figure 36

#### INSTALLATION

1. Align holes in sight mount assembly with holes at base of RCO.
2. Apply sealing compound to two pan head slotted bolts.
3. Install bolts and tighten with flat head screw driver until tight. Be careful not to strip the heads.
4. Periodically check pan head slotted bolts. If loose, apply sealing compound and retighten.

## **REMOVAL AND REPLACEMENT OF ADJUSTER CAP ASSEMBLY**

Personnel Needed: One

Tools/Equipment Needed: Small Arms Tool Kit (5180-01-506-8287)

Equipment Condition: RCO removed from weapon.

### **REMOVAL**

1. Remove the azimuth and elevation adjuster caps from the RCO.

#### **CAUTION**

Remove only the UPPER RIGHT eyepiece bolt. Removing, loosening, or otherwise tampering with any of the other eyepiece bolts will permanently damage the seal and will void the RCO warranty.

2. Using a 7/64 in. hex head wrench, remove and discard the upper right eyepiece bolt to free the adjuster cap retention wire.

### **REPLACEMENT**

1. Attach the azimuth and elevation caps from the new adjuster cap assembly to the RCO.
2. Position the center of the adjuster cap assembly retention wire in the slot (1) (illustration shows slot highlighted in white) behind the eyepiece bolt (see figure 38).

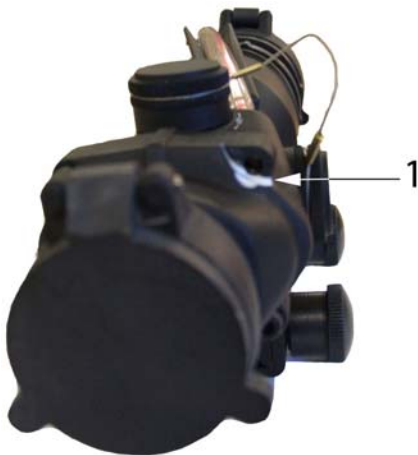


Figure 37

5. Using a  $7/64$  in. hex head wrench, install and hand tighten a NEW eyepiece bolt, securing the retention wire in its slot. The retention wire should still move freely from side to side within the slot.

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### REPAIR OF M150

Personnel Needed: One

Tools/Equipment Needed: None

Equipment Condition: RCO removed from weapon.

**WARNING**



**TRITIUM GAS (H-3)**

Because of the radioactive material contained in the M150 Sight, Rifle Combat Optic, repair of defective M150 Sight, Rifle Combat Optics, is only authorized by the manufacturer, Trijicon, Inc. Contact the Radiation Safety Officer (RSO) for handling and replacement instructions. Contact the Service Command Technical Point of Contact for warranty service instructions and return procedures.

The RSO MUST contact Trijicon, Inc. for shipping instructions to: Trijicon, Inc., 49385 Shafer Ave., Wixom, MI 48393-0059. Telephone 1-800-338-0563 from 0900 to 1700 EST.

The tritium lamps are guaranteed to glow for at least ten years from the original purchase date.

## MAINTENANCE ALLOCATION CHART (MAC)

### Introduction

#### The Army Maintenance System MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

This MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field – includes three subcolumns, Crew (C), Service (O), and Field (F).

Sustainment – includes two subcolumns, Below Depot (H) and Depot (D)

The maintenance to be performed below depot and in the field is described as follows:

1. Service maintenance. The responsibility of a using organization to perform maintenance on its assigned equipment. It normally consists of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and subassemblies. The replace function for this level of maintenance is indicated by the letter "O" in the third position of the SMR code. An "O" appearing in the fourth position of the SMR code indicates complete repair is possible at the service maintenance level.
2. Field maintenance. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "F" appearing in the third position of the SMR code. An "F" appearing in the fourth position of the SMR code indicates complete repair is possible at the field maintenance level. Items are returned to the user after maintenance is performed at this level.

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3. Below depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "H" appearing in the third position of the SMR code. An "H" appearing in the fourth position of the SMR code indicates complete repair is possible at the below depot sustainment maintenance level. Items are returned to the supply system after maintenance is performed at this level.

The tools and test equipment requirements table (immediately following the MAC) lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks table (immediately following the tools and test equipment requirements) contains supplemental instructions and explanatory notes for a particular maintenance function.

### **Maintenance Functions**

Maintenance functions are limited to and defined as follows:

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms. The following are examples of service functions:

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- a. Unpack. To remove from packing box for service or when required for the performance of maintenance operations.
  - b. Repack. To return item to packing box after service and other maintenance operations.
  - c. Clean. To rid the item of contamination.
  - d. Touch up. To spot paint scratched or blistered surfaces.
  - e. Mark. To restore obliterated identification.
4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
  5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.
  6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
  7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
  8. Paint (ammunition only). To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.
  9. Replace. To remove an unserviceable item and install a serviceable counterpart in its place "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.

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10. **Repair.** The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

### NOTE

The following definitions are applicable to the “repair” maintenance function:

**Services.** Inspect, test, service, adjust, align, calibrate, and/or replace.

**Fault location/troubleshooting.** The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

**Disassembly/assembly.** The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

**Actions.** Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

11. **Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.



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12. **Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

### **Explanation of Columns in the MAC**

Column (1) Group Number. Column (1) lists Functional Group Code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above).

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

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### Field:

- C Crew maintenance
- O Service maintenance
- F Field maintenance

### Sustainment:

- L Specialized Repair Activity (SRA)
- H Below depot maintenance
- D Depot maintenance

### **NOTE**

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

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### **Explanation of Columns in the Tools and Test Equipment Requirements**

Column (1) - Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) - Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) - Nomenclature. Name or identification of the tool or test equipment.

Column (4) - National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) - Tool Number. The manufacturer's part number.

### **Explanation of Columns in the Remarks**

Column (1) - Remarks Code. The code recorded in column (6) of the MAC.

Column (2) - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

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**Table 4. Maintenance Allocation Chart**

(1) Group No.	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools And Equip	(6) Remarks Code
			FIELD			SUSTAINMENT			
			CREW	SERVICE	FIELD	BELOW DEPOT	DEPOT		
			C	O	F	H	D		
00	M150 Rifle, Combat Optic with Case	Inspect Service Replace	0.1 0.2		0.5			1	
01	M150 Optic Assembly	Inspect Service Repair	0.1 0.2		0.2				A
0101	Adjustment Cap Assembly	Inspect Replace	0.1		0.1			1	A
0102	Laser Filter/Anti- Reflection Device	Inspect Replace	0.1 0.1						A
02	Mount Assembly	Inspect Service Replace	0.2 0.1		0.1 0.5			1 1	A

**TM 9-1240-416-13&P****Table 5. Tools and Test Equipment for the M150 Rifle, Combat Optic**

<b>TOOLS OR TEST EQUIPMENT REF CODE</b>	<b>MAINTENANCE LEVEL</b>	<b>NOMENCLATURE</b>	<b>NATIONAL STOCK NUMBER</b>	<b>TOOL/PART NUMBER</b>
1	O	Tool Kit, Small Arms Repairman	5180-01-506-8287	SC5180-95-B71

**Table 6. Remarks for M150 Rifle, Combat Optic**

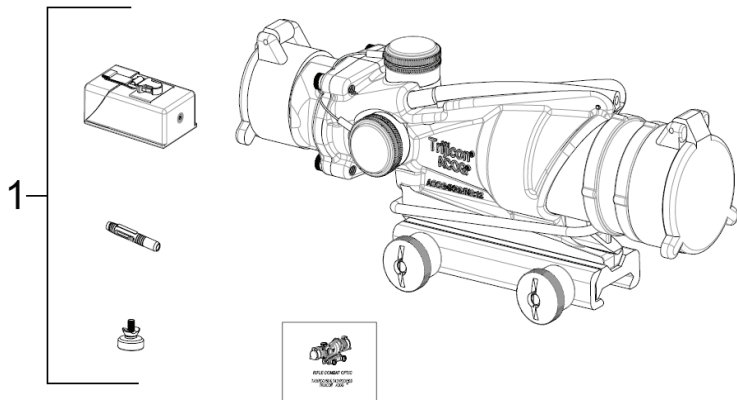
<b>REMARKS CODE</b>	<b>REMARKS</b>
A	Preventive Maintenance Checks and Services (PMCS)



**Chapter 4: Repair Parts and Special Tools List**

**M150 KIT**

Figure 38 identifies the M150 kit as supplied.



**Figure 38**

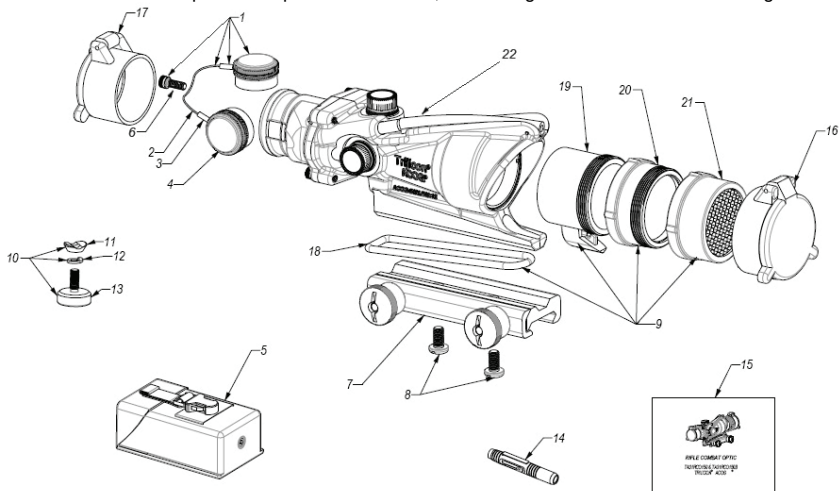


**TM 9-1240-416-13&P****TABLE 7. M150 COMPONENTS LIST (PROVIDED AS A KIT)**

<b>Item No.</b>	<b>National Stock Number</b>	<b>Description &amp; Part Number (Cage)</b>	<b>U/I</b>	<b>SMR Code</b>	<b>Qty</b>
1	1240-01-557-1897	Sight, Bore, Optical M150. Includes LFU/ARD/Flip up Caps, soft case, Lens pen, Manual, and screw set for mounting to the M16A2 Rifle. 13019540 (19200)	Ea.	PAFKK	1

**M150 EXPLODED VIEW**

To order additional or replacement parts for the M150, refer to Figure 39 for item number designation.



**Figure 39**

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**TABLE 8. M150 COMPONENTS LIST (INDIVIDUAL)**

<b>Item No.</b>	<b>National Stock Number</b>	<b>Description &amp; Part number (Cage)</b>	<b>U/I</b>	<b>SMR Code</b>	<b>Qty</b>
1	5340-01-559-3866	Adjuster caps and retention wire assembly ACA3298-2 (0FL29)	Ea.	PAFZZ	1
2		Adjuster cap retention wire, Stainless ACA2753-1	Ea.	XAFZZ	1
3		Adjuster cap retention wire crimp sleeve ACA2754-1	Ea.	XAFZZ	2
4		Adjuster cap with fastener button SUB-ACA3066-2	Ea.	XAFZZ	2
5	1240-01-535-4485	Soft Case, MOLLE, Brown ACA3053-1	Ea.	PACZZ	1
6		Eyepiece screw 6-32x3/8 SHCS SUB-HSC1504-2	Ea.	XAFZZ	1
7	1240-01-527-7101	MIL-STD-1913 Rail Interface (TA51 mount) TA51	Ea.	PAFZZ	1
8	5305-01-531-6659	TA51 mount screws 10-32x3/8 SS Pan Head SUB-HSC2070-1	Ea.	PAFZZ	2
9	1240-01-540-2890	Anti-Reflection Device (LFU/ARD) Modular 13010580	Ea.	PACZZ	1

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<b>Item No.</b>	<b>National Stock Number</b>	<b>Description &amp; Part number (Cage)</b>	<b>U/I</b>	<b>SMR Code</b>	<b>Qty</b>
10	5305-01-559-3863	M16A2 Mounting assembly Thumb Screw TA54A	Ea.	PACZZ	1
11		Special Washer M16A2 Thumb Screw mount ACA3017-1	Ea.	XACZZ	1
12		Lock Washer M16A2 Thumb Screw mount ACC2592-1	Ea.	XACZZ	1
13		Thumb Screw M16A2 mount SUB-ACC3086-1	Ea.	XACZZ	1
14	1240-01-535-0972	Lens Cleaning Tool LENS PEN	Ea.	PACZZ	1
15		TM 9-1240-416-13&P Operator and Filed Maintenance Manual Including Repair Parts and Special Tools List for the M150 Sight, Rifle Combat Optic	Ea.		1
16	6650-01-559-3862	Objective Lens Flip Cover ACA3295-1	Ea.	PACZZ	1
17	6650-01-560-0133	Eye Piece Lens Flip Cover ACA3294-1	Ea.	PACZZ	1
18	5331-00-702-4725	LFU/ARD Retaining Band AS568A-033 (81343)	Ea.	PACZZ	1

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<b>Item No.</b>	<b>National Stock Number</b>	<b>Description &amp; Part number (Cage)</b>	<b>U/I</b>	<b>SMR Code</b>	<b>Qty</b>
19		ARD Adapter ACA3129-1	Ea.	XACZZ	1
20		Screw on LFU ACA3319-1	Ea.	XACZZ	1
21	6650-01-559-3861	Anti-Reflection Device-modular ACA3131-1	Ea.	PACZZ	1
22		M150 Sub-Assembly SUB-M150 (OFL29)	Ea.	XAFZZ	1



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**APPENDIX A: OFFSETS**

**Table 9. M150 RCO Offsets**

<b>Weapon</b>	<b>Accessory</b>	<b>Mount</b>	<b>Range Zeroed To</b>	<b>25m M16A2/A4 Tgt Zero Offset Squares</b>	<b>10m Boresight Tgt Offset cm</b>
M4-M16A4 MWS	RCO	Mounted on upper receiver	300m	1.5D	0.0 4.7U
M4-M16A4/M203 MWS	RCO	Mounted on upper receiver	300m	0.0	0.0 6.7U
M16A2	RCO	Mounted on the Carrying handle	300m	3.0D	0.0 7.0U
M249	RCO	Mounted on Feed Tray Cover Rail	400m	1.2D	0.0 7.2U





**APPENDIX B: EXPENDABLE AND DURABLE ITEMS LIST**

**SCOPE**

This work package lists expendable and durable supplies and materials that you will need to operate and maintain the sight. This listing is for informational only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts, and Heraldic Items) or CTA 8-100, Army Medical Department Expendable/Durable Items.

**EXPLANATION OF COLUMNS**

**Column (1) – Item No.** This number is assigned to the entry in the listing for referencing when required.

**Column (2) – Level.** This column identifies the lowest level of maintenance that requires the item: C.....Operator/Crew.

**Column (3) – National Stock Number (NSN).** This is the national stock number assigned to the item. Use this number to request or requisition the item.

**Column (4) – Item Name, Description, Part Number/(CAGEC).** This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

**Column (5) – U/I.** Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

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**TABLE 10. EXPENDABLE AND DURABLE SUPPLIES AND MATERIALS LIST**

(1) Item No.	(2) Level	(3) National Stock Number	(4) Item Name, Description, Part Number/(CAGEC)	(5) (U/I)
1	C	8030-01-104-5392	Sealing Compound (Loctite), 2 Type and N Grade Blue Thread Locking Compound, qty 10 per pkg, MIL-S-46163 (81349)	PKG

By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.  
*General, United States Army*  
*Chief of Staff*

Official:

A handwritten signature in black ink that reads "Joyce E. Morrow". The signature is written in a cursive, flowing style.

JOYCE E. MORROW  
*Administrative Assistant to the*  
*Secretary of the Army*

0802502

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