

# CHAPTER 1

## INTRODUCTION

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### Section I. GENERAL

**1. Purpose.** This training circular provides guidance for the conduct of training with the Starlight Scope, Small Hand-Held or Individual Weapons Mounted, Model No. 6060 (hereafter referred to as the Starlight Scope).

**2. Scope.** This circular contains a complete description of the Starlight Scope, mechanical training to include assembly, disassembly, operation, functioning, installation, and maintenance, and marksmanship training to include aiming, positions, zeroing, and other information pertinent to its employment and the conduct of operator

training. This material is applicable, without modification, to nuclear and nonnuclear warfare.

**3. Responsibility of Users.** Users of this training circular are encouraged to submit recommended changes and comments to improve the publication. Comments should be keyed to the specific page, paragraph, and line of text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commandant, United States Army Infantry School, Fort Benning, Ga. 31905.

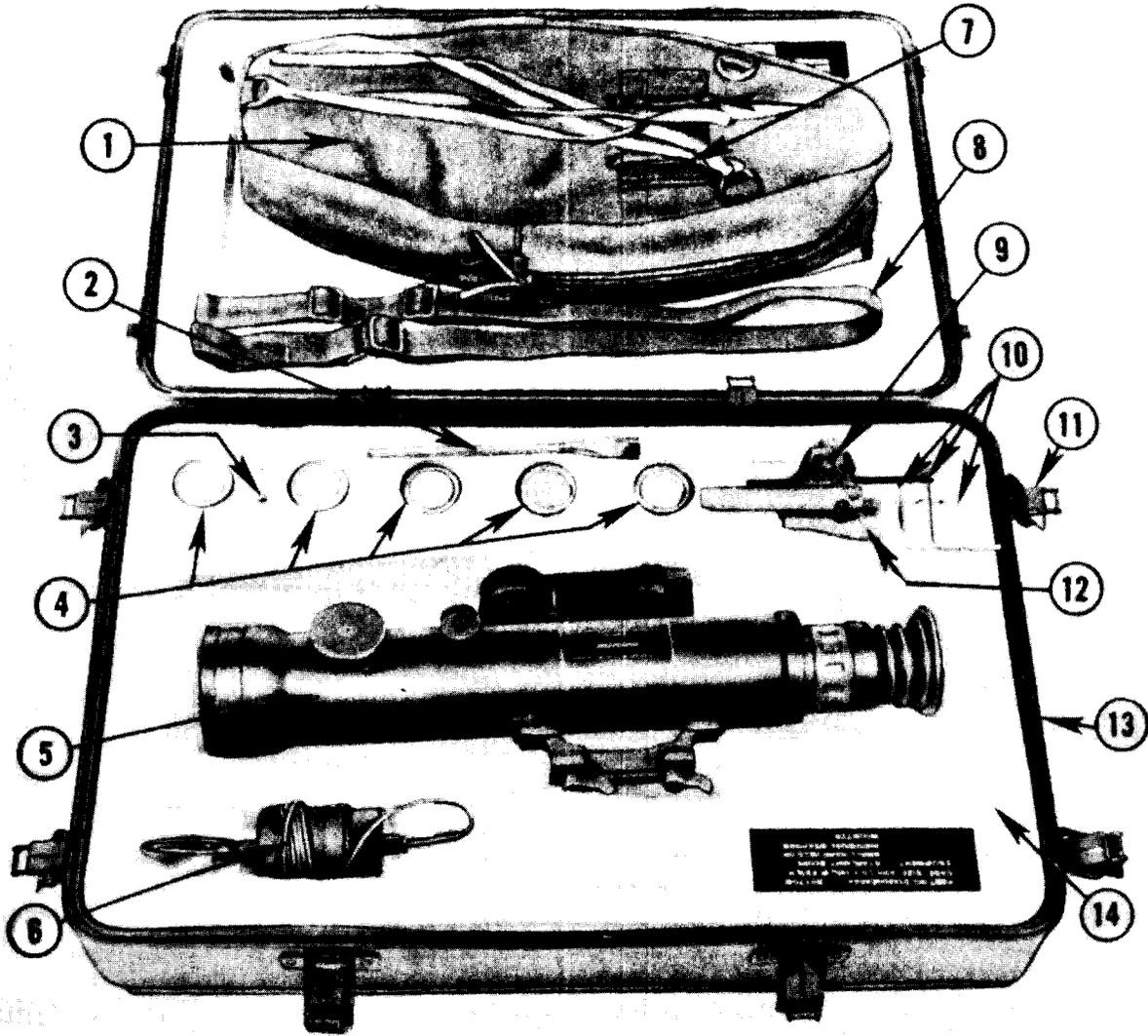
### Section II. DESCRIPTION AND DATA

**4. Description.** *a. General.* The Starlight Scope is a portable, battery powered, electro-optical instrument for passive visual observation and aimed fire of weapons at night. It uses the natural light (moonlight and/or starlight) of the night sky for target illumination. The Starlight Scope, since it does not project a visible or infrared light, offers freedom from the possibility of enemy detection. The Starlight Scope is designed for employment on the M14, M14A2, and XM16E1 rifles, M60 machinegun, 40-mm grenade launcher M79, 90-mm recoilless rifle M67, and the 66-mm high explosive antitank rocket M72.

*b. Shipping Container.* The Starlight Scope and accessories are shipped and stored in a metal case (fig. 1) with top and bottom foam contour liners to provide maximum protection. The shipping container is fitted with a carrying bundle, eight latches and latch clasps, a pressure relief valve with instruction plate, and identification plate. Inserted under the foam liner in the lid of the shipping container are maintenance forms and TM 11-1090-268-15.

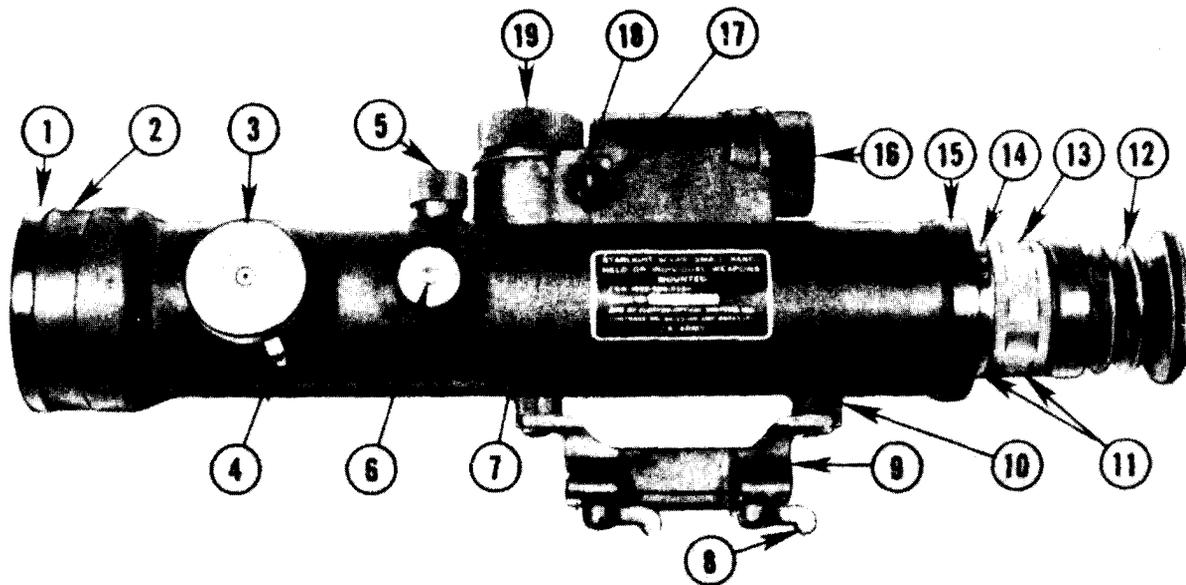
*c. Starlight Scope.* The Starlight Scope (fig. 2) consists of the main housing, objective lens assembly, objective focusing knob and locking lever, sight reticle assembly with elevation and azimuth adjustment knobs, integral high voltage power supply system with a three-way toggle-type control witch and switch guard, eyepiece assembly with focus ring and attached rubber eyeshield, telescope mount assembly, image intensifier tube, and a lens cap.

- (1) The main housing (fig. 2) is a lightweight machined casting of tubular configuration which holds all the other components or subassemblies of the Starlight Scope.
- (2) The objective lens assembly (fig 2), located in the front of the main housing, consists of an objective lens cell and four single glass elements. These glass elements are held inside the objective lens assembly by three spacers and a retainer. The interior of the assembly is purged in an atmosphere of dry nitrogen to prevent lens fogging.



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|-------------------------------------|--|
| 1. CANVAS CARRY CASE                | 8. NYLON CARRYING STRAP                            |
| 2. LENS BRUSH                       | 9. WEAPON ADAPTER BRACKET FOR XM16E1               |
| 3. SIGHT RETICLE LAMP (2)           | 10. ALLEN WRENCH                                   |
| 4. BATTERY (5)                      | 11. LATCH (8)                                      |
| 5. STARLIGHT SCOPE                  | 12. WEAPON ADAPTER BRACKET FOR M 14 OR M14A2 RIFLE |
| 6. LOW TEMPERATURE ADAPTER ASSEMBLY | 13. SHIPPING CONTAINER                             |
| 7. KEEPER AND SLIDE ASSEMBLY        | 14. FOAM CONTOUR LINER                             |

Figure 1. Shipping container, Starlight Scope and accessories.



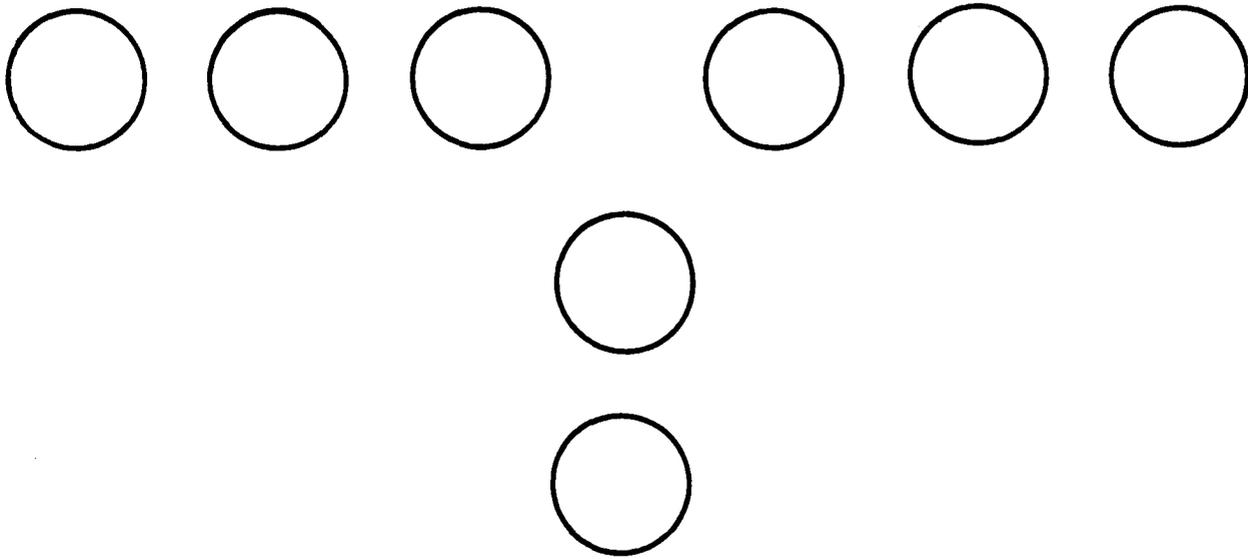
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|------------------------------|---------------------------|
| 1. LENS CAP                  | 11. EYEPIECE ASSEMBLY     |
| 2. OBJECTIVE LENS ASSEMBLY   | 12. RUBBER EYESHIELD      |
| 3. FOCUSING KNOB             | 13. EYEPIECE FOCUS RING   |
| 4. LOCKING LEVER             | 14. DIOPTRER SCALE        |
| 5. ELEVATION ADJUSTMENT KNOB | 15. EYEPIECE RETAINER NUT |
| 6. AZIMUTH ADJUSTMENT KNOB   | 16. BATTERY CAP           |
| 7. MAIN HOUSING              | 17. CONTROL SWITCH        |
| 8. LOCK KNOB (2)             | 18. SWITCH GUARD          |
| 9. TELESCOPE MOUNT ASSEMBLY  | 19. OSCILLATOR CAP        |
| 10. MOUNTING STUD (2)        |                           |

Figure 2. Starlight Scope.

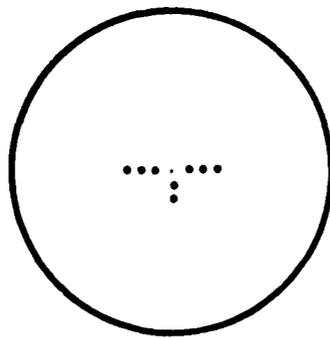
(3) The objective focusing knob and locking lever (fig. 2) permit movement of the objective lens assembly within the main housing for distance focusing. For viewing near objects the objective lens assembly is moved forward in the main housing, and for viewing distant objects the objective lens assembly is moved rearward. This movement is accomplished by an eccentric shaft which is rotated by turning the knurled focusing knob. The locking lever enables the operator to lock the objective lens assembly at the desired distance focal position. This locking action prevents movement of the objective lens assembly when the weapon is fired. When the Starlight Scope is employed as a hand-held viewer, it is usually not necessary to lock the objective lens assembly in place.

Locking may be accomplished by rotating the locking lever in either a clockwise or counterclockwise direction; however, for best locking action, clockwise rotation is recommended.

(4) The sight reticle assembly is located in the main housing just forward of the image intensifier tube. The reticle pattern (⊕, fig. 3) is of a T-type configuration. There are six dots (beads) displayed at the top of the T and two dots (beads) on the stem of the T. The aiming reference dot is the top dot in the stem of the T. The aiming reference dot is positioned in the center of mass of the target to obtain the correct sight picture. The reticle pattern may be adjusted by rotating the elevation and azimuth adjust-

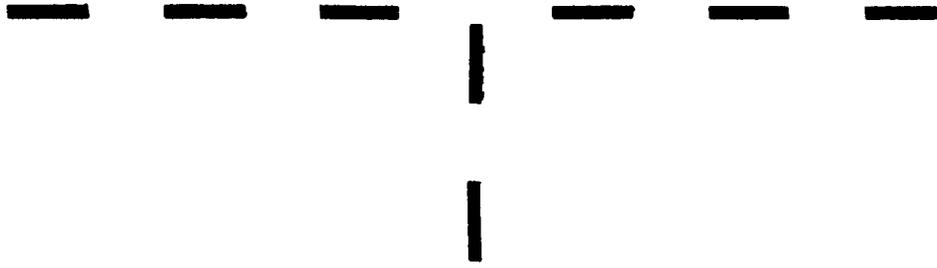


**RETICLE PATTERN ENLARGED**

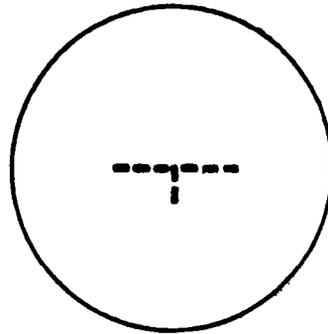


**① BEAD TYPE RETICLE**

*Figure 3. Sight reticle pattern.*



**RETICLE PATTERN ENLARGED**



**② BLACK LINE RETICLE**

*Figure 3.—Continued.*

ment knobs moves the strike of the bullet 3 inches (7.62 cm) at 150 meters. The sight reticle is designed for use as a passive (without power) reticle under high light level conditions. However, provisions have been made to permit "charging" of the reticle to compensate for low light level conditions. (A black line reticle (⊙, fig. 3) will replace the bead-type reticle in the very near future.)

- (5) The power supply system for the Starlight Scope consists of a power supply housing (fig. 2), a 6.75-volt mercury cell battery, a high voltage oscillator, wiring, and a toggle switch. The three-position toggle switch (fig. 2) provides for sight ON (passive reticle), sight OFF, and reticle CHARGE positions. The middle position of the switch is sight OFF. The upper position of the switch is sight ON, and the lower position of the switch permits CHARGING of the reticle.
- (6) The eyepiece assembly (fig. 2) mates into the rear of the main housing and is held in position by the eyepiece retaining nut. The eyepiece assembly consists of six glass elements (2 doublets, a singlet, and a window). One of the doublets and the singlet glass element are capable of forward and rearward movement by means of the eyepiece focus ring (fig. 2). This movement enables the operator to focus the eyepiece assembly to meet individual eye requirements. A diopter scale (fig. 2) is engraved on the eyepiece assembly immediately forward of the focus ring. This diopter scale enables the operator, once he has obtained his own focal setting, to preset the eyepiece focus ring, thus eliminating the necessity for refocusing the eyepiece each time the Starlight Scope is used. The eyepiece assembly is purged in an atmosphere of dry nitrogen to prevent lens fogging. Attached to the eyepiece assembly is a rubber eyeshield (fig. 2) which protects the eye from shock caused by recoil when the weapon is fired. The rubber eye-

shield also aids in security by providing the operator with a means of covering the areas around the eye, thus preventing light leaks on other areas of the face caused by the visible glow emitted from the rear of the eyepiece assembly.

*Note.* The Starlight Scope may be shipped with either a "secure" or "nonsecure" rubber eyeshield. The eyeshields are identical except the "secure" eyeshield has a rubber flap over the end which must be pulled aside before the operator can view through the eyepiece. Upon removal of the eyeshield from the eye, the flap closes and is held shut by two magnets.

- (7) Installed on the underside of the main housing is the telescope mount assembly which provides a means of mounting the Starlight Scope to the weapons adapter bracket (fig. 2). It is equipped with two locking knobs which are used to secure the mount assembly to the weapons adapter bracket.
- (8) The image intensifier tube is located inside the main housing between the sight reticle assembly and the eyepiece assembly. It concentrates and intensifies the ambient light of the night sky to such a degree that distant objects appear as images within the Starlight Scope.
- (9) The lens cap (fig. 2) mounts over the objective lens. It has three small pinholes drilled around its center to limit the amount of light entering into the Starlight Scope. This permits operation of the Starlight Scope during daylight hours for zeroing purposes.

*d. Accessories.* Shipped and stored in the shipping container, as accessories to the Starlight Scope, are five 6.75-volt mercury batteries, two sight reticle lamps, two weapons adapter brackets, three allen wrenches, a low temperature adapter assembly, 8 canvas carrying case, a nylon carrying strap, and a lens brush and lens tissue (fig. 1).

- (1) The 6.75-volt mercury battery provides the power required for operation of the Starlight Scope. Five batteries are shipped with the Starlight Scope; however, four are spares since only one is needed for operation of the equipment.

- The battery does not have a recharging capability. When its use-life has been expended, the battery is discarded (para 9 b (l)).
- (2) Even though two sight reticle lamps are shipped as accessories to the Starlight Scope, the operator is not authorized to remove and/or install lamps within the Starlight Scope. When turned on, the lamp provides the visible illumination necessary to charge the sight reticle.
  - (3) Two weapons adapter brackets are contained in the shipping container. One bracket is for mounting the Starlight Scope to the M14 or M14A2 rifles and one bracket permits installation of the Starlight Scope to the XM16E1 rifle. A separate weapons adaptor bracket is provided for mounting the Starlight Scope to each of the other weapons listed in paragraph 4a and may be procured through normal supply channels.
  - (4) The three allen wrenches are the basic tools required by the operator for disassembly and assembly of the Starlight Scope and for installation of the weapons adapter brackets (saddle block for M60 machinegun excluded).
  - (5) The low temperature adapter assembly permits operation of the Starlight Scope during low or arctic temperatures. The low temperature adapter assembly may be assembled to the battery housing, permitting the operator to carry the battery inside the battery adapter case. The battery and battery adapter case may then be positioned inside the clothing of the operator where body heat will protect the battery against low temperatures.  
*Note.* Some models do not contain a low temperature adapter assembly.
  - (6) The canvas carrying case affords protection and provides the operator with a means of transporting the Starlight Scope in other than the shipping container. The case has a keeper and slide assembly for attachment to the pistol or cartridge belt. A zipper is installed for closure of the case.
  - (7) The nylon carrying strap has adjustable loops at either end for attachment to the Starlight Scope to provide an additional carrying capability.
  - (8) A lens brush and lens tissue are provided for cleaning the objective lens and the eye lens.

### 5. Tabulated Data. a. Starlight Scope.

Magnification-----	4 power.
Field of view-----	171 mils (average).
Eyepiece focus-----	+4 to - 4 diopters.
Objective lens focus---	4 meters to infinity.
Weight-----	5 pounds, 14 3/4 ounces.
Length-----	18.50 inches.
Width-----	3.35 inches.
Height-----	5.2 inches.
Range-----	Dependent on ambient light level.
Operating temperature---	-65° to + 125° F. at humidity ranging from 0 to 100 percent.

### b. Battery.

Type -----	BA 1100 ( )-u Mercury.
Voltage -----	6.75.
Number of cells -----	5.
Use life -----	Approximately 100 hours.
Shelf life -----	2 years at optimum storage

### c. Shipping Container.

Length -----	22.5 inches.
Width -----	14.25 inches.
Height -----	6.38 inches.
Weight -----	16 pounds, 12 ounces