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INSTALLATION AND OPERATION MANUAL
FOR THE
ADJUSTABLE RANGING TELESCOPE (ART)
MOUNTED ON THE MATCH CONDITIONED
7.62MM M-14 RIFLE

September 1968

U. S. ARMY LIMITED WAR LABORATORY
Aberdeen Proving Ground, Maryland 21005

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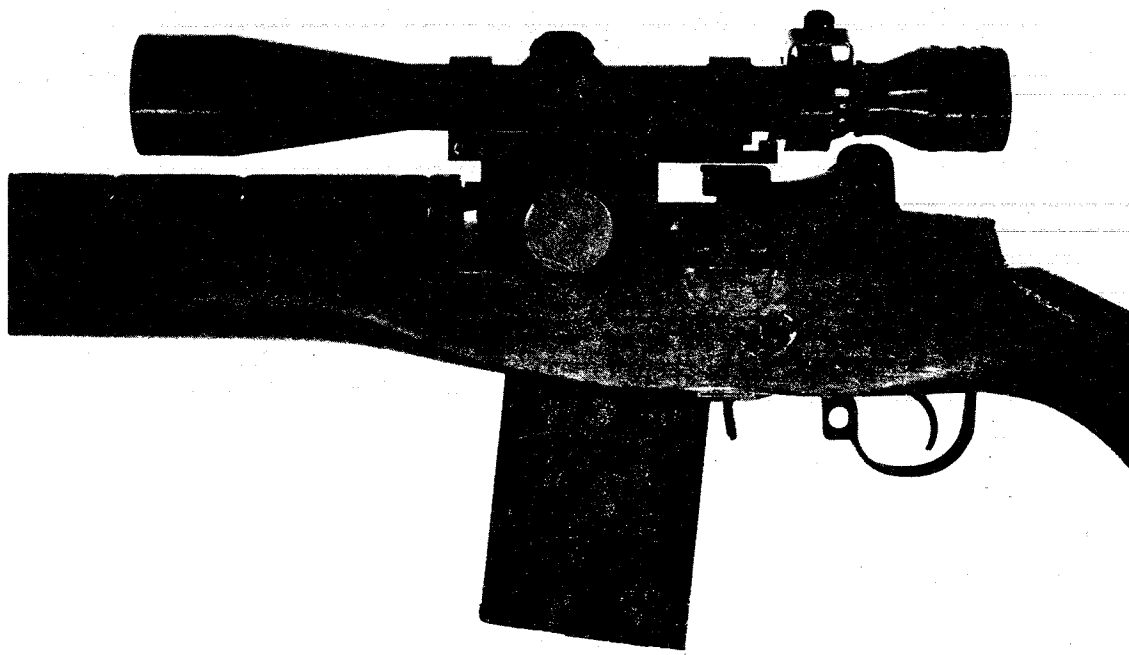
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Adjustable Ranging Telescope Mounted on the M-14 Rifle

CHAPTER I

PURPOSE AND SCOPE

1. PURPOSE.

This manual contains the installation and operating instructions for the Adjustable Ranging Telescope (ART). It is to be used by field personnel to whom the ART is assigned.

2. SCOPE.

a. Chapter 2 of the Manual, Description and Installation, supplies a detailed description, installation information, and physical characteristics (tabulated data) of the Adjustable Ranging Telescope.

b. Chapter 3, Operation, describes the operation of the ART.

CHAPTER 2

DESCRIPTION AND INSTALLATION

3. DESCRIPTION.

The Adjustable Ranging Telescope (ART) uses a camming principle, in conjunction with the range finding principle inherent in the Redfield 3X - 9X Variable Power "Accu-range" Telescope. The telescope reticle has stadia marks on it which subtend a known height of 30 inches on the target, at varying ranges, by adjusting the telescope power through the power adjusting ring. A cam is attached to the power adjusting ring which causes the angle of departure, and thus the "zero", to change as the power changes. A lock is provided on the power adjusting ring so the power, and zero, will not change with consecutive firings at a given setting. The Adjustable Ranging Telescope is provided with a mount for the M-14 Rifle and a ballistic cam for the M-118 NM cartridge.

NOTE: The expected accuracy of this system can only be realized when used with the Match-conditioned M-14 Rifle, the M-118 NM cartridge and a competition level, long-range rifleman. The ballistic cam provided is made specifically for the M-118 ctg. and will not give the proper angles of departure for any other ballistically different cartridge.

Each ART is provided with a watertight carrying case (Figures 1 & 2). The Power Adjusting Ring must be at 3 power for storage. (See Fig. 5)

4. MOUNTING.

The ART is mounted on the M-14 Rifle using the location provided on the left side of the receiver. Tighten the Mounting Screw (Fig. 3) firmly by hand. DO NOT use wrench or pliers. The mounting screw is held on the mount base by an "E" ring (Fig. 4) to avoid losing the screw.

NOTE: Make certain there is a lock washer under the head of the mounting screw. If the lock washer is missing, the mount cannot be tightened to the weapon and the screw may interfere with the bolt.

Each ART should be sighted in with a specific weapon and should remain with that weapon. In other words, Rifle, M-14, Serial #ABCD, should have ART, Serial #EFGH mounted. Each ART/ Rifle should be fired for zero by the rifleman to whom the weapon is assigned, as no two shooters fire to the same zero.

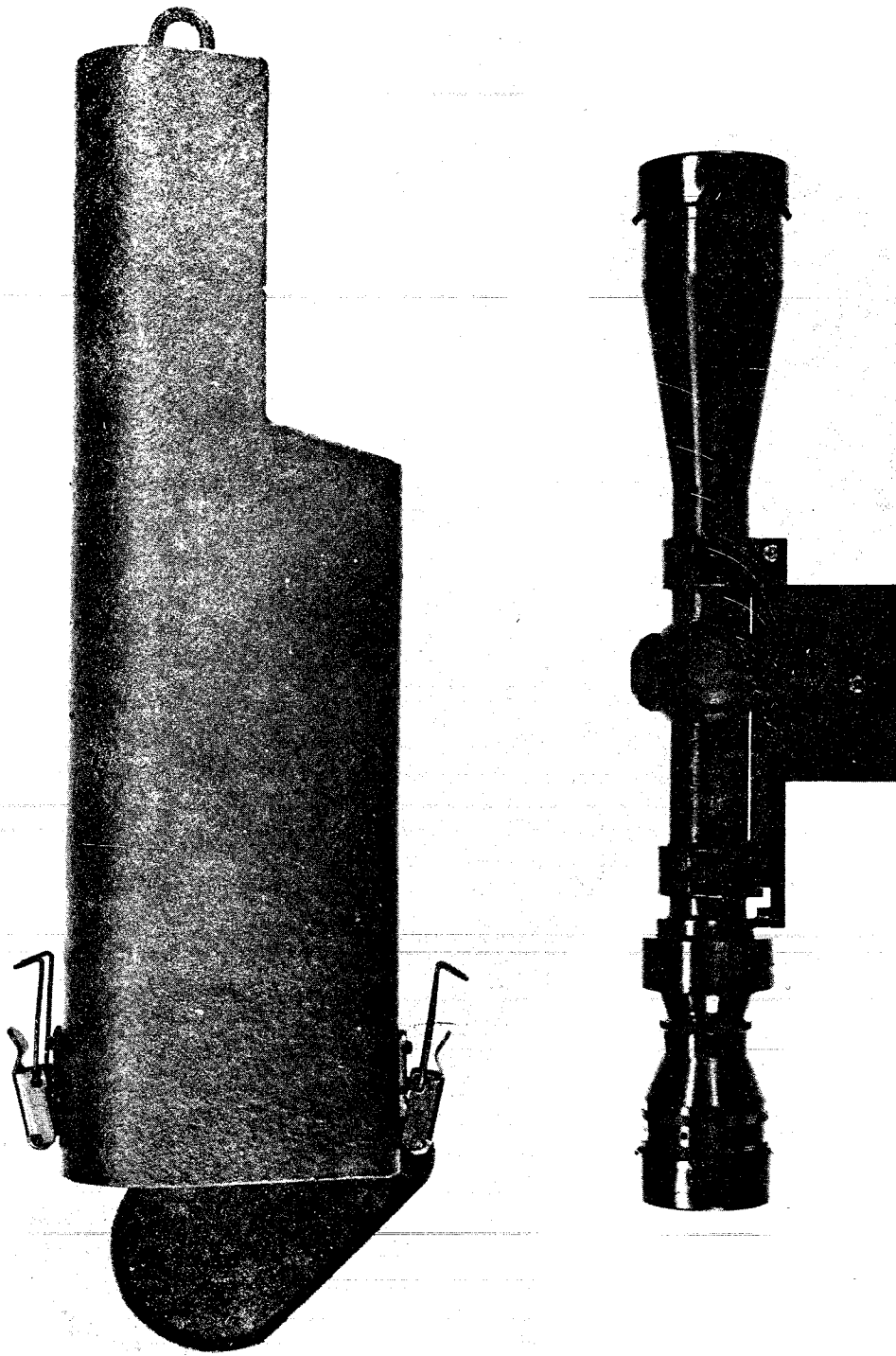


Figure 1. Adjustable Ranging Telescope with Carrying Case.

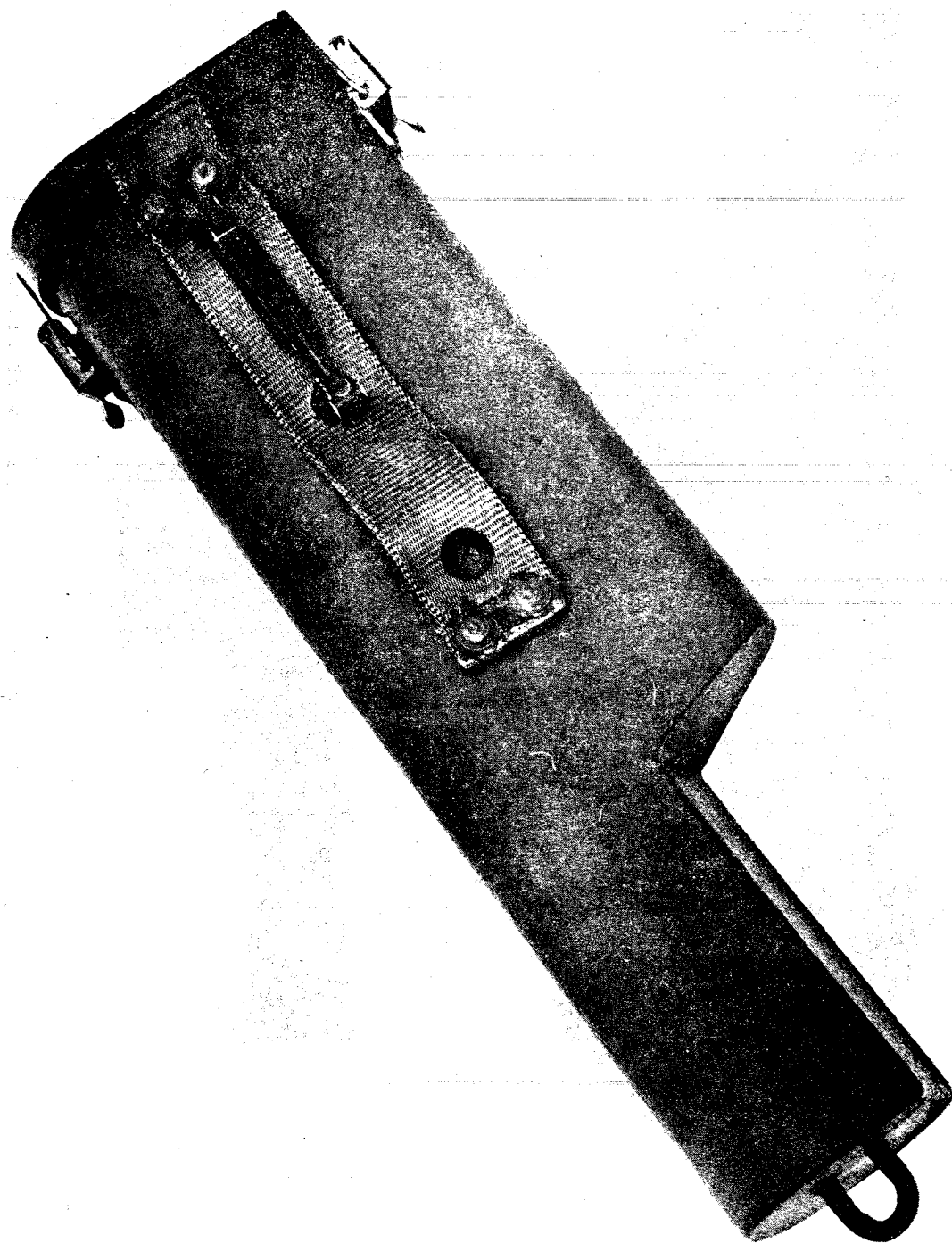


Figure 2. Carrying Case - Reverse Side.

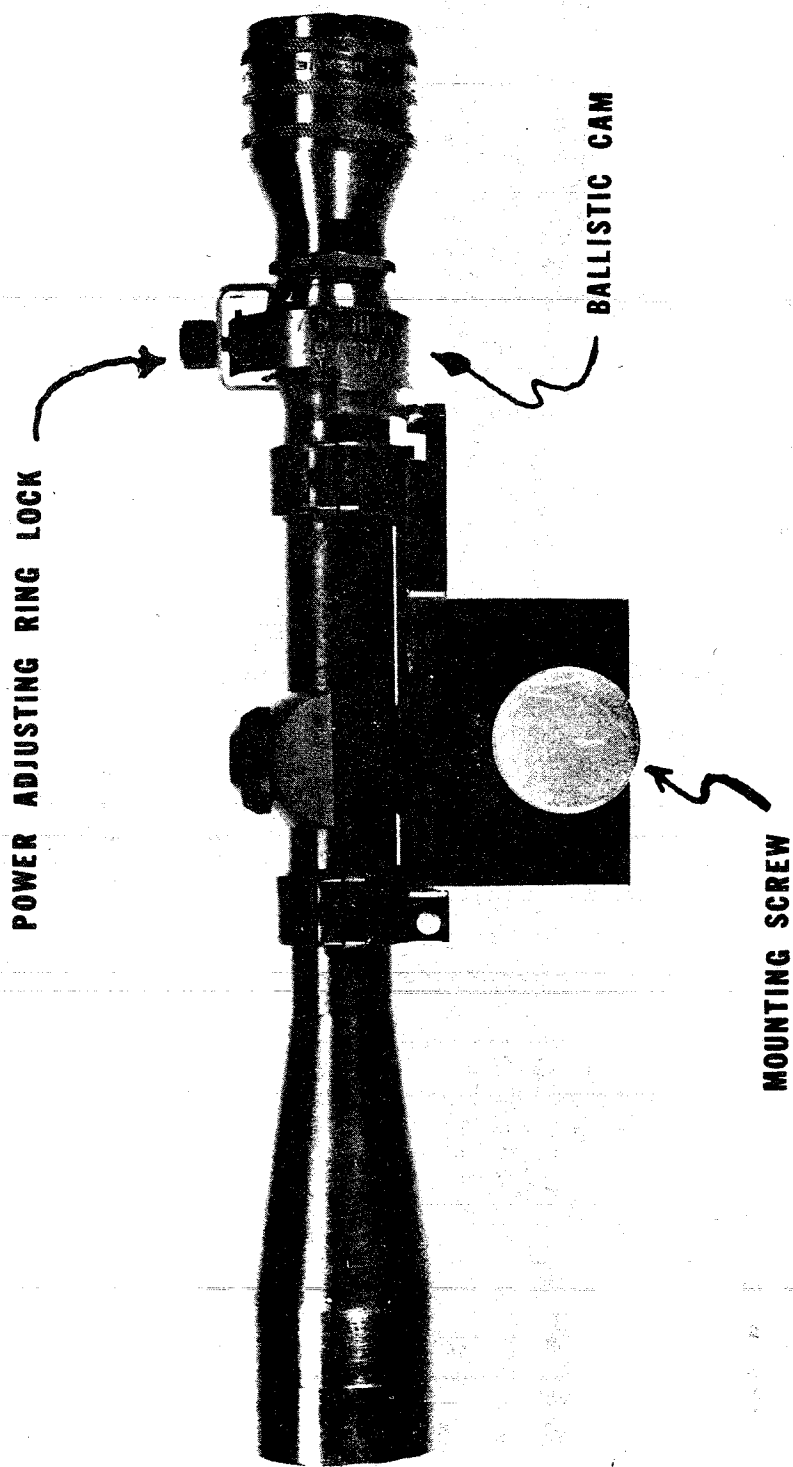


Figure 3. Telescope & Mount - Left Side.

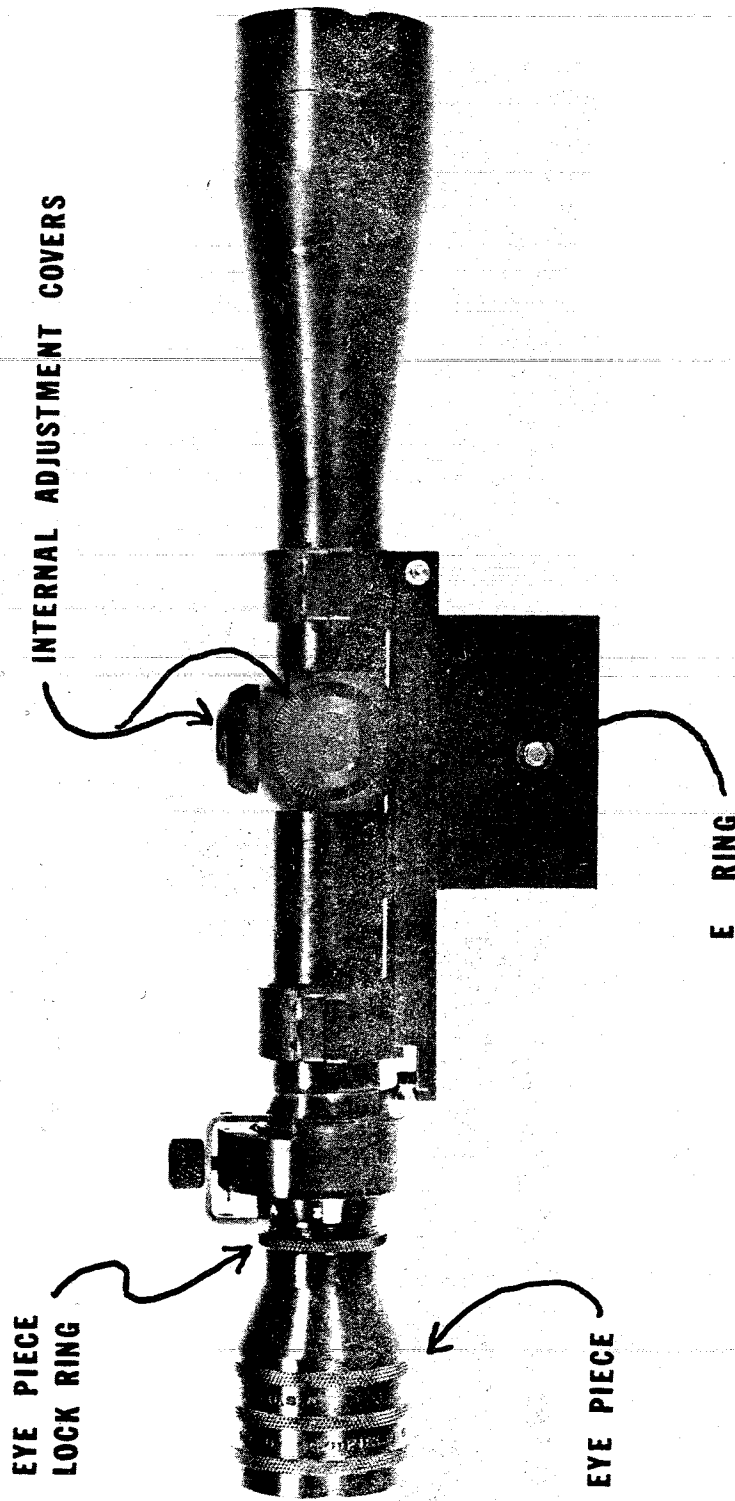


Figure 4. Telescope & Mount - Right Side.

CAM POSITION FOR STORAGE

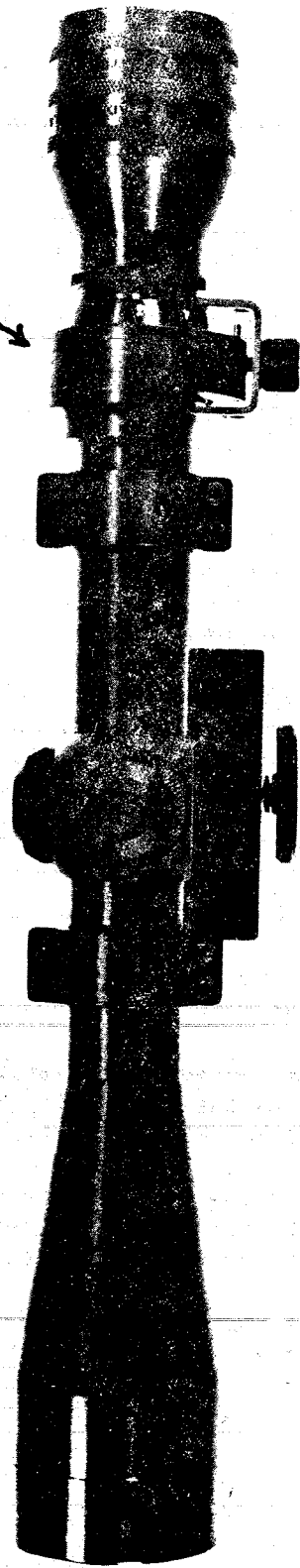


Figure 5. Telescope & Mount - Top View.

5. FOCUSING.

It is very important that the telescope be focused to the individual shooter's eye. This is accomplished in the following manner;

a. Set the telescope power adjusting ring on 9 power after loosening the adjusting ring lock. (See Fig. 4)

b. Loosen the knurled locking ring ahead of the eyepiece.

c. Turn the eyepiece to the left, counterclockwise, until the crosshairs on the reticle are out of focus with the eye at normal relief of 3 to $3\frac{1}{2}$ inches.

d. Point the scope at a bright background and rapidly adjust the eyepiece clockwise until the reticle appears sharp and clear to a hasty glance. (Quick glances simulate actual field shooting. Slow study of the crosshairs allows your eye to adjust, which is not possible under field conditions.)

e. LOCK THE EYEPIECE IN FOCUS WITH THE KNURLED LOCKING RING (FIGURE 4). DO NOT PERMIT ANYONE TO CHANGE THIS EYEPIECE POSITION. The reticle of your telescope is now in focus for your eye and should not need to be focused again.

6. SIGHTING IN.

When sighting in, use the following procedure:

a. Make certain the mount is firmly attached to the weapon and has no movement.

b. Unlock the power adjusting ring lock (Fig. 3) by turning the knurled screw to the left until the lock is loose. Set the telescope power on 3 and relock by tightening with thumb and forefinger.

NOTE: Sighting in with the ART must be done at 300 meters with the telescope set on 3 power for the ranging feature to work properly.

c. Remove the internal adjustment covers (Fig. 4) which expose the adjustment screws. These can be operated with the fingers, as well as a thin coin or key. The top turret is for vertical adjustment and the side turret is for horizontal adjustment.

d. Turn the adjustment screws in the direction you wish the impact on the target to change. (UP and RIGHT are marked.) Each graduation on the adjusting screw changes the point of impact $\frac{1}{2}$ inch at 100 yards, or a little over $1\frac{1}{2}$ inches at 300 meters.

NOTE: IMPORTANT! Do not move adjustments beyond the point where they produce reticle movement, as the mechanism may become disengaged and require factory repair.

e. The first time the ART mount is placed on a rifle, several shots should be fired to seat the mounting interfaces. Retighten the mounting screw and continue the sighting in operation.

f. Replace the internal adjustment covers, making sure they are tightened firmly. This is not necessary for sealing, but to avoid inadvertently moving the adjustment.

7. TABULATED DATA.

a. Telescope.

Commercial Redfield 3X to 9X Variable, with modified ranging reticle.

Ranging Capability - 300 to 900 meters when subtending 30 inches between vertical stadia marks.

Eye relief - 3 to 3½ inches.

Cam - for the M-118 NM cartridge.

Weight - with mount, complete - 22 ounces.

b. Mount.

Material - Aluminum Alloy - 7075 - T6

Screws -

(1) Base to weapon - Special - 12-32 NS.

(2) Scope to Mount - 5-40 NC x ¼.

Coating -

Mount - Chromic acid anodize, dyed black.

Cam - Martin Hardcoat, dyed black.

c. Carrying Case.

Material - Aluminum Alloy - 6061 - T6, coated w/ Vinyl paint.

Weight - 18 ounces empty, 40 ounces with scope and mount.

CHAPTER 3

OPERATION

8. OPERATION.

SPECIAL NOTE:

This is a precision optical instrument and, as such, extra care should be taken to avoid immersion in water and hard knocks. In other words, BABY IT!

a. Ranges to 300 Meters.

Firing out to 300 meters will normally be done with the telescope set on three power. At this range and setting, the crosshairs are used without regard to the stadia marks on the reticle.

NOTE: The maximum ordinate of the M-118 ctg. at 300 meters is about 7 to 8 inches. The bullet rise should be allowed for when firing at less than 300 meters.

b. Stadia Marks.

The telescope reticle will show two sets of stadia marks on the crosshairs. (See Figure 6.)

(1) Vertical Stadia Marks.

The marks on the vertical crosshair are spaced to subtend 30 inches at 300 meters. Beyond 300 meters, the power adjusting ring is used to change the telescope power so that a 30 inch target may be spaced between the stadia marks. When this is done, the telescope should now be zeroed for the target range. Place the crosshairs on the target and fire.

(2) Horizontal Stadia Marks.

The stadia marks on the horizontal crosshair will subtend 60 inches at 300 meters. From either side mark to the center will subtend 30 inches and may be used the same way as the vertical stadia marks. The horizontal stadia marks may also be used to estimate side hold for windage.

NOTE: A 10-knot cross wind will deflect the M-118 bullet about 20 inches at 600 meters.

ADJUSTABLE RANGING TELESCOPE

RETICLE CONFIGURATION

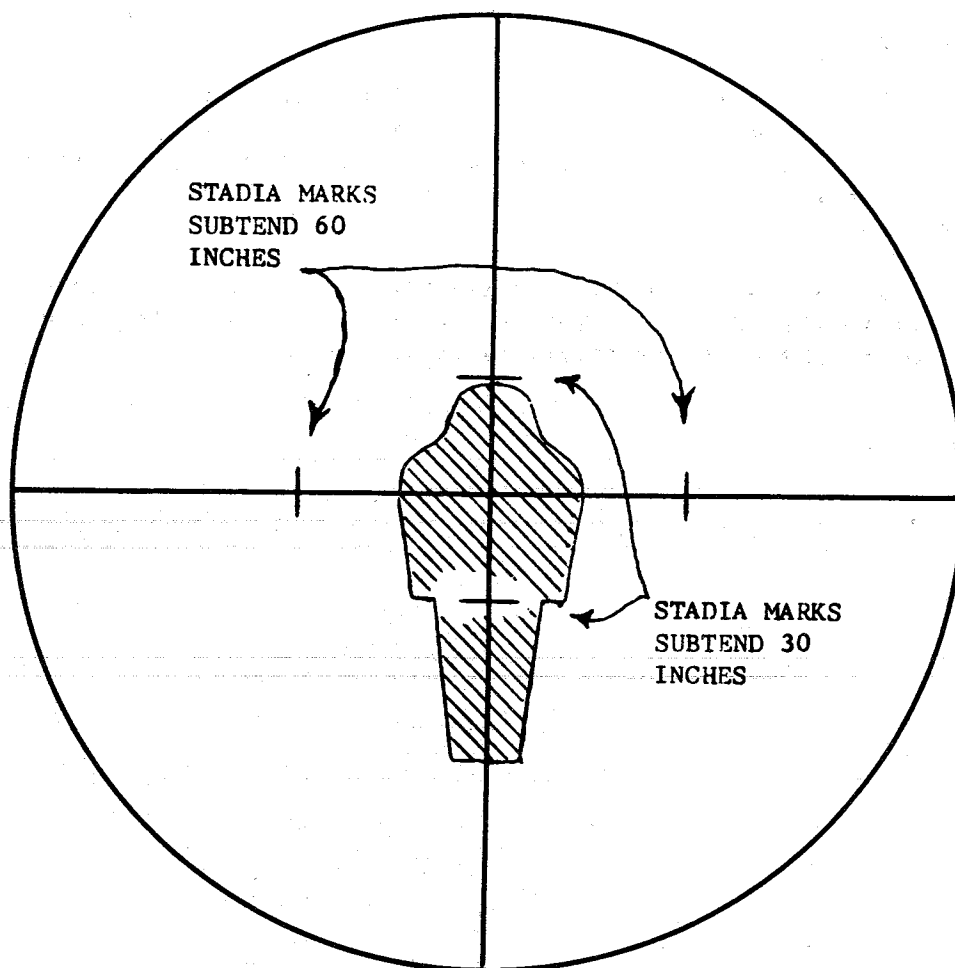


Figure 6.

c. Power Adjusting Ring.

The power adjusting ring has a locking device (Figure 3) which must be unlocked before attempting to change the telescope power and must be tightened after adjustment and before firing. If the ring is not locked, repeated firing at any scope setting will cause the setting to change and, in so doing, change the center of impact.

d. Eye Relief.

CAUTION: Normal eye relief of this telescope is 3 to 3½ inches. If the eye is too close to the telescope eyepiece, recoil of the weapon will drive the eyepiece into the face or eye. With proper eye relief, the sight picture should be full and clear with no fuzziness at the edges.

There is NO allowable eye relief adjustment of the telescope within the ART mount. The cam, which is fixed to the telescope, must remain in its relationship to the mount.

