

This document reproduces the complete and unabridged text of a United States Army Field Manual first published by the Department of the Army, Washington DC.

All source material contained in the reproduced document has been approved for public release and unlimited distribution by an agency of the US Government. Any US Government markings in this reproduction that indicate limited distribution or classified material have been superseded by downgrading instructions that were promulgated by an agency of the US government after the original publication of the document.

No US government agency is associated with the publishing of this reproduction.

Digital viewer interface reformatting, viewer interface bookmarks and viewer interface links were revised, edited, ammended, and or provided for this edition by I.L. Holdridge.

This page and the viewer interface reformatting
© I.L. Holdridge 1999.
All rights reserved.

TRAINING CIRCULAR

No. 23-18

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 24 August 1967

NIGHT OBSERVATION DEVICE, MEDIUM RANGE (NODMR)

CHAPTER 1. INTRODUCTION

SECTION I. General	Paragraph	Page
Purpose.....	1	3
Scope.....	2	3
Responsibility of users.....	3	3
II. Description and Data		
Description.....	4	3
Tabulated data.....	5	12

CHAPTER 2. MECHANICAL TRAINING

SECTION I. Disassembly and Assembly		
General.....	6	15
Disassembly.....	7	15
Assembly.....	8	15
II. Installation, and Operation and Functioning		
Installation.....	9	18
Operation and functioning.....	10	20
III. Maintenance, Troubleshooting, and Destruction		
General.....	11	23
Tools and equipment.....	12	23
Care and cleaning.....	13	23
Troubleshooting.....	14	24
Destruction to prevent enemy use.....	15	26

CHAPTER 3. OPERATOR TRAINING

SECTION I. Introduction		
General.....	16	31
Purpose.....	17	31
II. Preparatory Training		
Operator skills.....	18	31
Special instructions.....	19	31
Positions.....	20	31
III. Orientation Procedures		
General.....	21	32
Orientation.....	22	32
Reticle pattern.....	23	32

CHAPTER 4. EMPLOYMENT CONSIDERATIONS

General.....	24	35
Factors affecting employment.....	25	35
Employment considerations.....	26	36
NODMR positions.....	27	36
Offensive operations.....	28	36
Defensive operations.....	29	37

	Paragraph	Page
CHAPTER 5. NIGHT OBSERVATION DEVICE MEDIUM RANGE TRAINING COURSES		
General.....	30	39
NODMR Operator's training course (5 hours).....	31	39
NODMR Operator's training course modified (3 hours)....	32	39
Ammunition table.....	33	39
Instructor's notes.....	34	40
APPENDIX A. REFERENCES.....		41
B. SAFETY.....		43
C. ADVICE TO INSTRUCTORS.....		45
D. SECURITY REQUIREMENTS CHECKLIST FOR IMAGE INTENSIFIER NIGHT VISION EQUIPMENT.....		47

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Purpose. This training circular provides guidance for the conduct of training with the Night Observation Device, Medium Range (hereafter referred to as the NODMR).

2. Scope. This circular contains a complete description of the NODMR, mechanical training to include assembly, disassembly, operation, functioning, installation, and maintenance. Information pertinent to the employment and the conduct of operator training is also included. This material is applicable, without modification, to nuclear and nonnuclear warfare.

3. Responsibility of Users. Users of this training circular are encouraged to recommend changes or provide 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

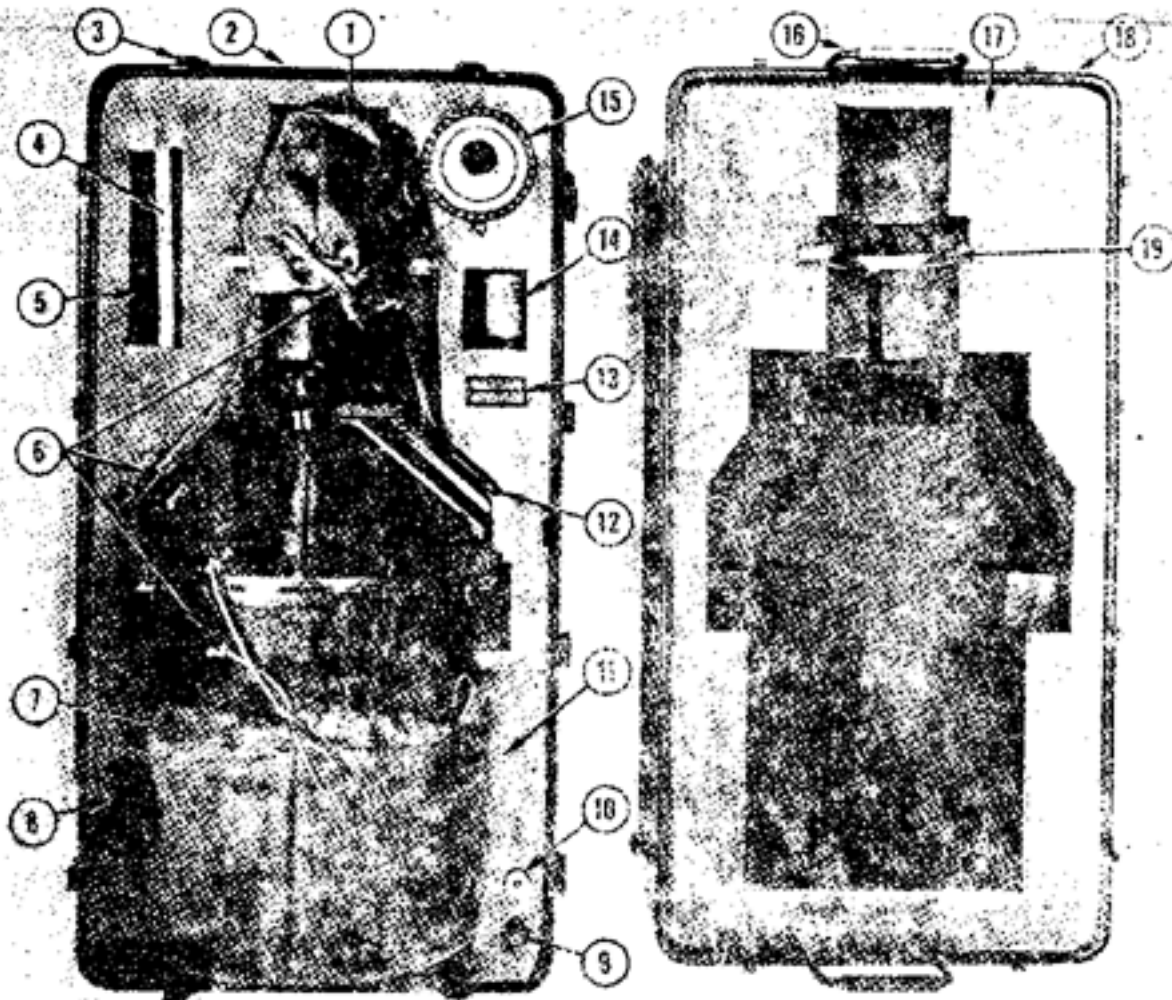
4. Description. *a. General.* The NODMR is a portable, battery-powered, electro-optical instrument for passive visual observation at night. It uses and amplifies the available light (moonlight, starlight, skyglow) for target illumination. The device can also use infrared and artificial illumination. Since the NODMR uses a passive system to illuminate the target area, and does not project a light, the device offers almost complete freedom from possible enemy detection. The device can be used for surveillance, target acquisition, and adjustment of direct and indirect fire at night. Employment considerations and capabilities are discussed in chapter 4. For information concerning differences in models refer to TM 11-5850-228-13. .

b. Shipping Container. The NODMR and accessories are shipped and stored in a metal case (fig 1) with upper and lower foam cushion liners to provide maximum protection. The large tripod is shipped and stored in a canvas carrying case (fig 2). The shipping container is fitted with a

carrying handle on each end, 12 latches and latch clasps, pressure relief valve with instruction plate, and identification plates.

c. NODMR. The NODMR as shown in figures 3 and 4 consists of the viewing device, yoke, adapter assembly, and legs. The device can be used in either the prone position with the legs and adapter assembly, or standing position with available large tripod and adapter assembly.

- (1) The viewing device (figs 3 and 4) consists of the objective housing assembly, objective lens assembly, objective shade assembly, objective shade lock knob, image tube housing, image focusing tube, power supply assembly, inline eyepiece assembly, focus ring, range focus ring, elevation lock knob, elevation dial, elevation vernier and level bubble.
- (a) The objective housing assembly contains the objective lens assembly and permits the attachment of the objective shade assembly. A guide groove on



- | | |
|----------------------------------|--------------------------------|
| 1. INLINE EYEPiece COVER | 11. LOWER CUSHION |
| 2. LOWER LID | 12. LEGS (3) |
| 3. LATCH (12) | 13. SPARE BATTERIES (PENLIGHT) |
| 4. MANUAL | 14. SPARE BATTERIES |
| 5. LENS BRUSH | 15. ADAPTER ASSEMBLY |
| 6. NIGHT OBSERVATION DEVICE | 16. CARRYING HANDLE (2) |
| 7. OBJECTIVE LENS ASSEMBLY COVER | 17. UPPER CUSHION |
| 8. SPARE LEGS (2) | 18. UPPER LID |
| 9. PENLIGHT | 19. UPPER BEARING BOARD |
| 10. OSCILLATOR | |

Figure 1. Shipping container, night observation device (FSN: 6850-906-0904), and accessories.

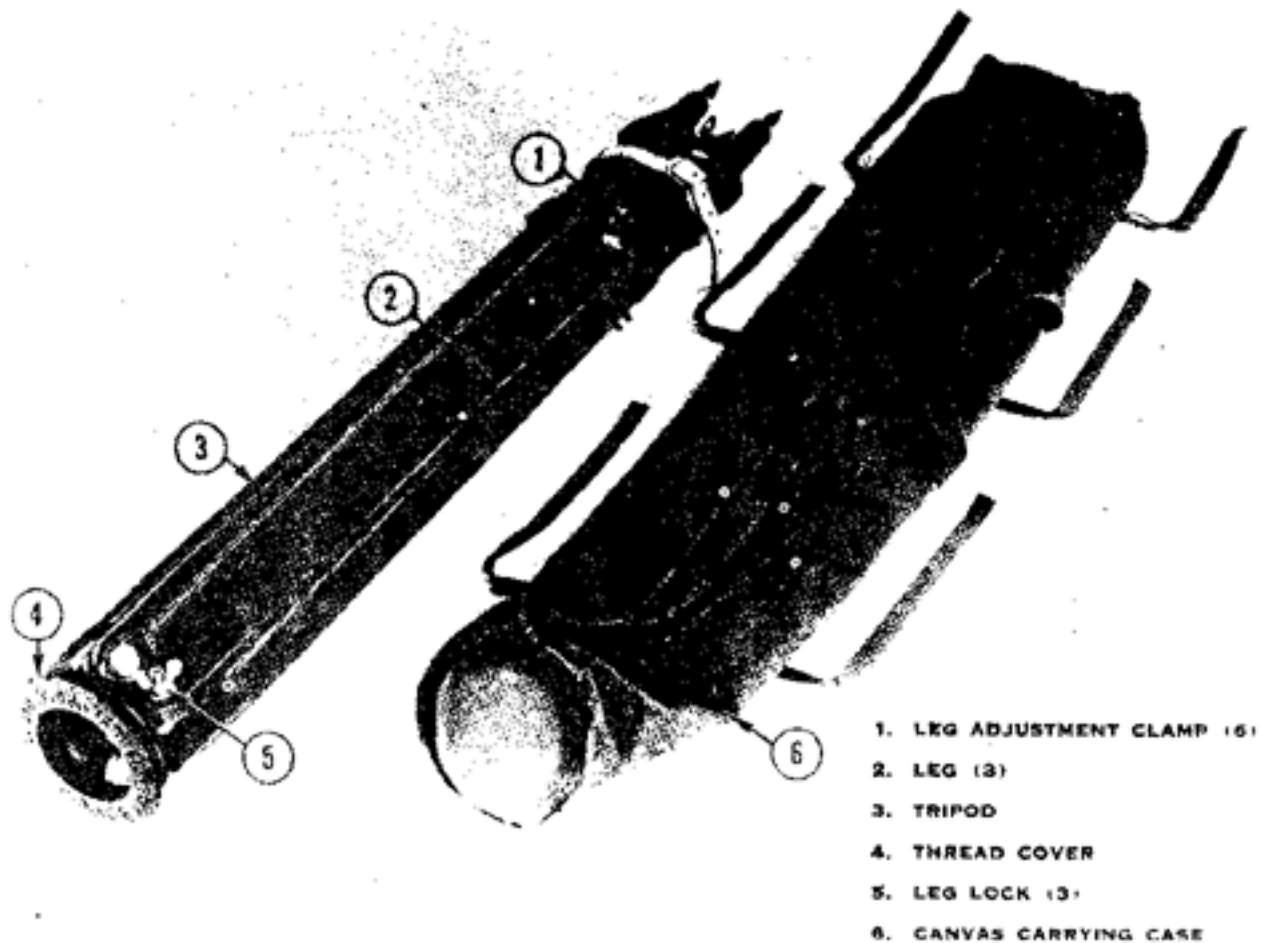


Figure 8. Large tripod and canvas carrying case.

- top of the objective housing assembly allows mounting of the objective shade assembly clamp.
- (b) The objective lens assembly, located in front of the main housing, consists of five lens cell assemblies, primary mirror assembly, and two O-rings. The interior of the lens assembly is purged and then filled with dry nitrogen to prevent internal lens fogging.
- (c) The objective shade assembly is mounted around the outside of the objective lens assembly and prevents the admission of stray light. A baffle mounted on the front of the objective lens assembly is a part of the objective shade assembly and also prevents the admission of stray light. The shade lock clamp (inside of shade) slides in the guide groove on top of the objective housing assembly. The shade is extended during operation, but is pushed to the rear before placing the NODMR in the shipping container.
- (d) The objective shade lock knob screws on the shade clamp and provides a means of tightening the shade clamp at a specific location on the guide groove.
- (e) The image tube housing is a lightweight machine casting which contains the image focusing tube and image in-

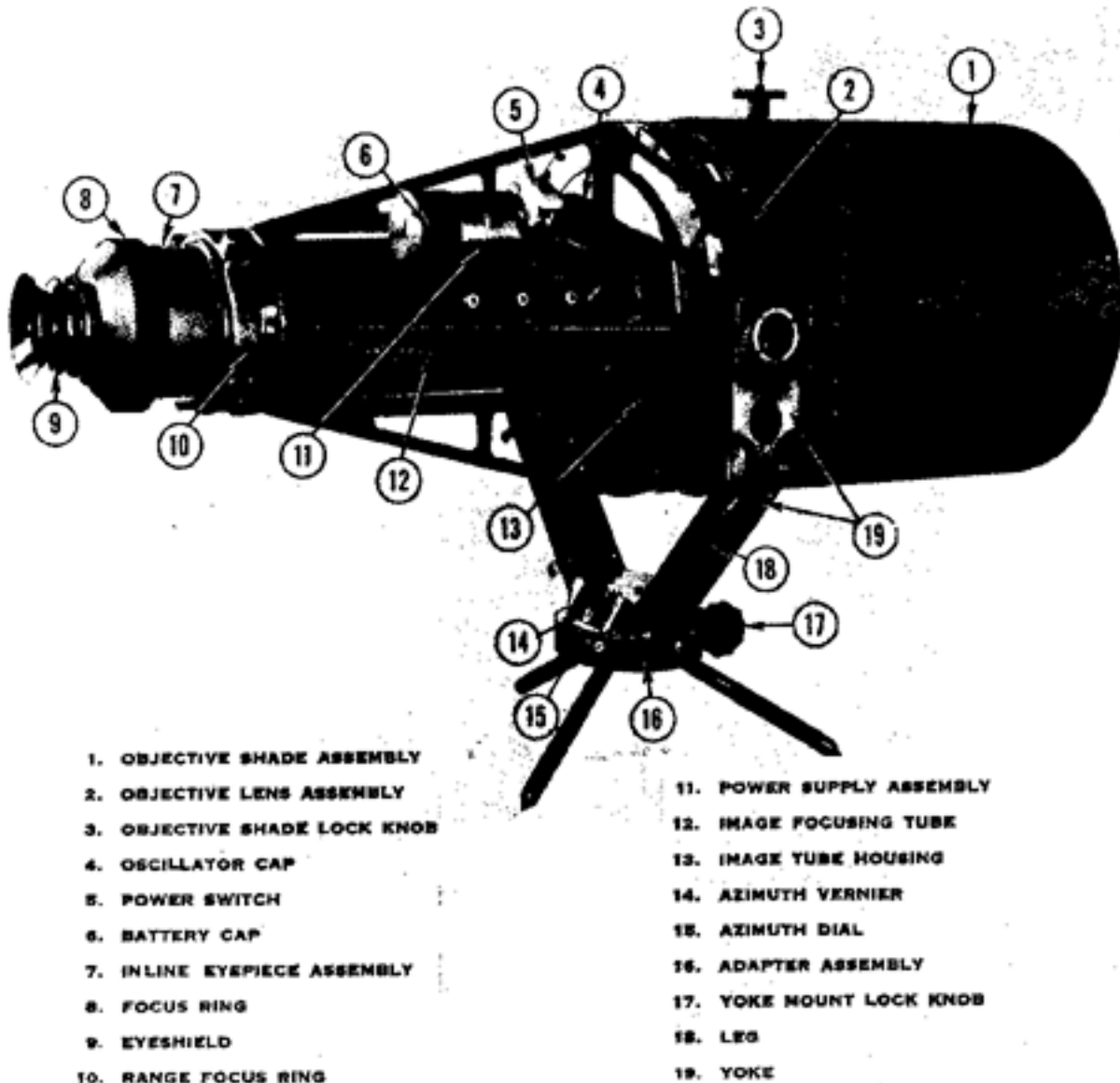


Figure 3. NODMR.

tensifier tube. The outside of the image tube housing assembly has four braces which protect the image focusing tube. The yoke assembly, objective lens assembly, range focusing ring, and inline eyepiece assembly are attached to the image tube housing. The power supply assembly mounts on the right side of the image focusing tube. The power supply assembly

includes the 6.75-volt mercury cell battery, high voltage oscillator, power switch, switch guard, associated wiring, connectors, terminal, oscillator ground clips, battery, and oscillator cap. The battery is the only power used to operate the NODMR.

(g) The inline eyepiece assembly magnifies the image presented on the focal plane of the image intensifier tube.

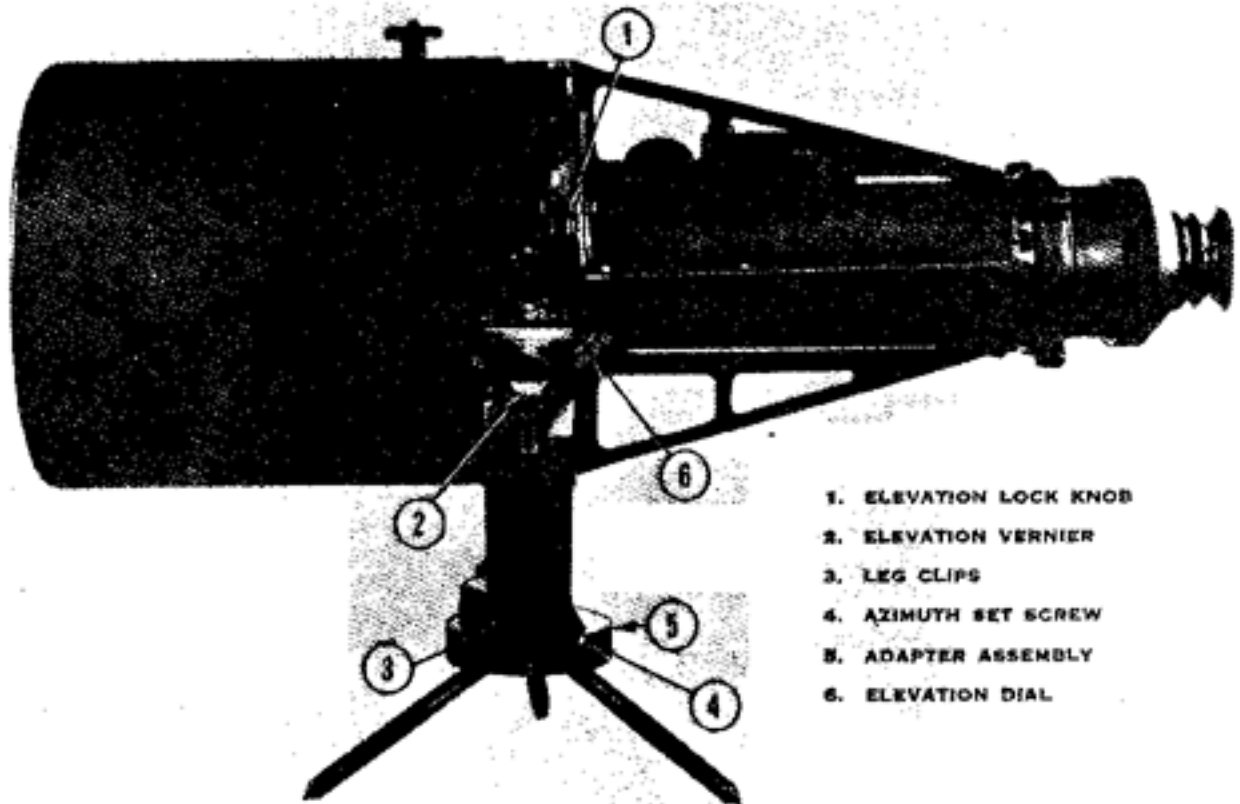


Figure 4. NODMR.

The eyepiece assembly screws into the rear of the image tube housing assembly, and consists of seven lenses. The focus ring allows the operator to focus the eyepiece assembly to meet individual eye requirements, and can be adjusted from a plus (+) 4 to a minus (-) 2.5 diopters. A modified eyepiece assembly can be adjusted from a plus (+) 4 to a minus (-) 4 diopters. Operators

should be instructed to use the highest diopter setting to avoid headaches from eyestrain. The focus ring has been adjusted properly when the operator sees the reticle pattern as clearly and sharply as possible. The eyepiece assembly is purged and then filled with dry nitrogen to prevent internal lens fogging. The original and modified eyepiece assemblies are shown in figure 5.

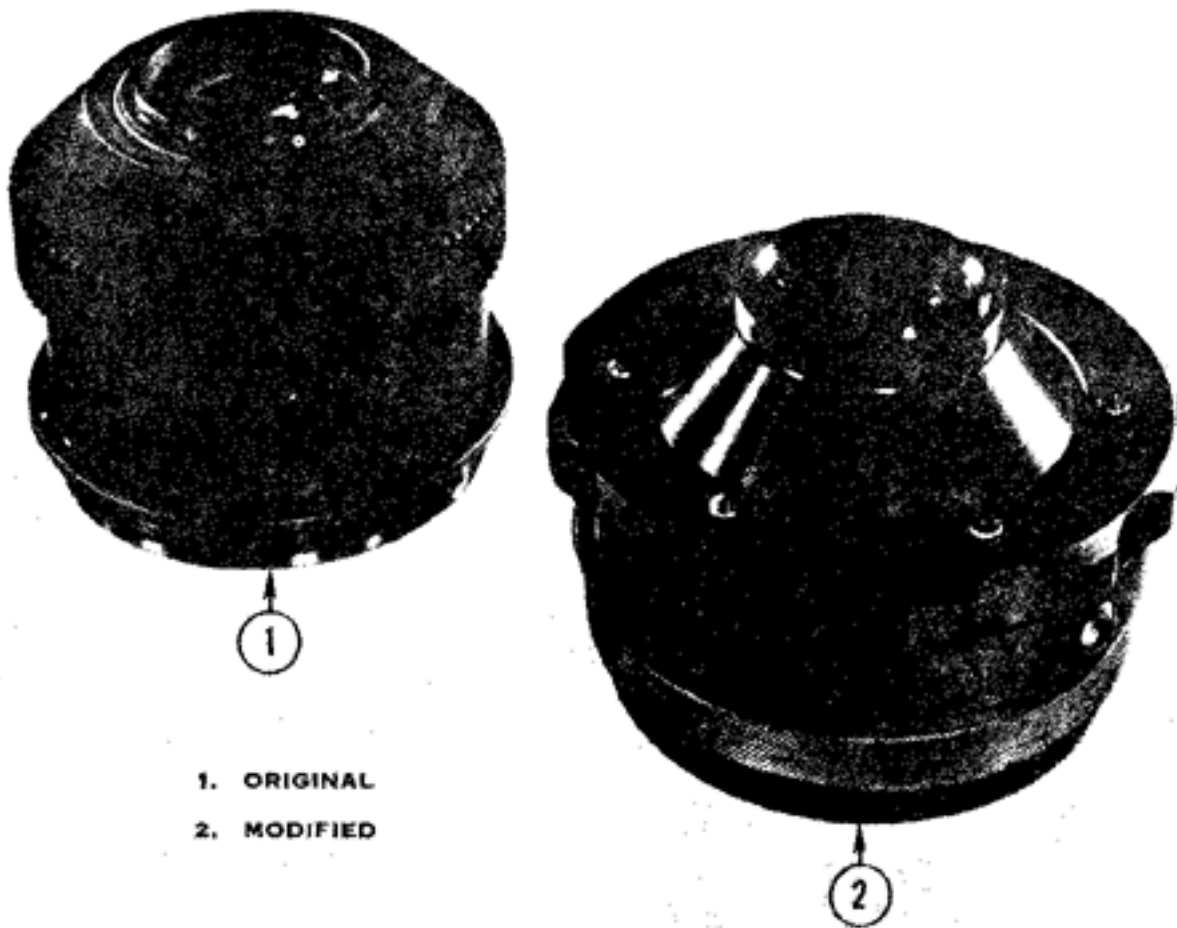


Figure 5. In-line eyepiece assemblies.

Attached to the eyepiece assembly is a rubber eyeshield, which protects the operator's eye and aids in light security. The eyeshield covers the area around the eye, thus preventing illumination of the face caused by the visible glow emitted from the rear of the eyepiece assembly. A modified rubber eyeshield (diaphragm type) is available and provides increased light security.

(h) The range focus ring allows the operator to focus on objects from 50 meters to the maximum range for the existing conditions. The range focus ring screws onto the image focusing tube and moves the image focusing tube within

the image tube housing assembly, thus varying the distance between the front of the image intensifier tube and the rear of the objective lens assembly.

- (i) The elevation dial (fig 6) is positioned on the left side of the yoke assembly and provides for accurate elevation readings from a minus (-) 640 to a plus (+) 940 mils. The dial is graduated in 20-mil increments numbered every 200 mils.
- (j) To provide greater accuracy when reading the elevation dial, an elevation vernier is mounted below the dial. The vernier is divided in 4-mil increments from plus (+) 20 mils to minus

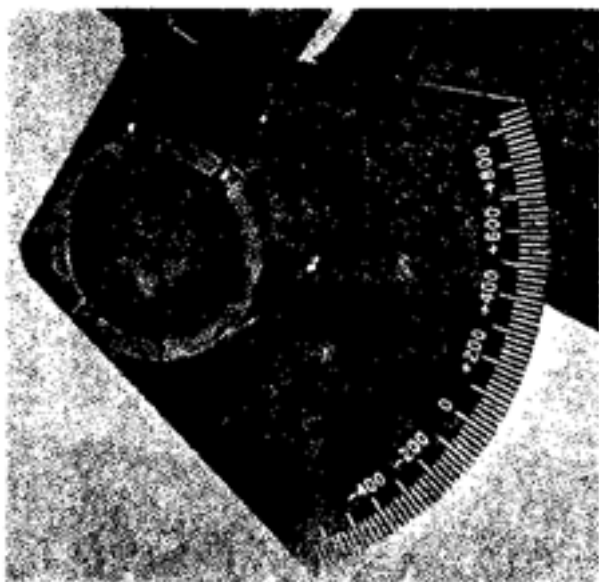


Figure 6. Elevation dial.

- (-) 20 mils. A modified vernier, graduated from plus (+) to minus (-) 20 mils and divided in 5-mil increments, has been developed to simplify reading angles and to conform to existing equipment.
- (k) An elevation lock knob is mounted above the elevation dial to provide a locking capability.
 - (l) A level bubble is mounted on the left side of the image tube housing to assist in leveling the NODMR (fig 7).
 - (m) The image intensifier tube is located inside the image focusing tube between the rear of the objective lens assembly and the front of the eyepiece assembly. It concentrates and intensifies the available light of the night sky to such a degree that distant objects appear as images within the NODMR.
 - (n) The reticle pattern (fig 8) located on the rear window of the image intensifier tube, assists in the adjustment of direct and indirect fire at night. The horizontal reticle pattern consists of a dash line. Each dash is 10 millimeters long and each space between dashes is also 10 millimeters. In the center of the



Figure 7. Level bubble.

horizontal reticle is a vertical graduation which indicates the center of the field of view. From the vertical graduation, left and right, to the first 10-millimeter line, is 5 millimeters. The vertical line is graduated in 10-millimeter increments.

- (2) The yoke assembly connects the image tube housing to the adapter assembly. An azimuth vernier is provided on the

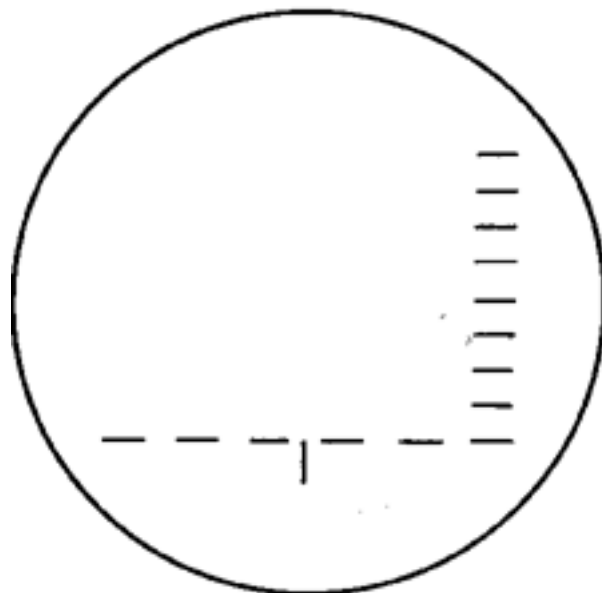


Figure 8. Reticle pattern.

base of the yoke assembly to permit accurate reading of the azimuth dial (fig 9).

- (3) The adapter assembly attaches to the NODMR yoke. The adapter assembly provides a means of mounting the NODMR on the tripods. When the three legs, clipped to the yoke, are removed and screwed into the three large holes in the base of the adapter assembly, the adapter assembly then becomes the adapter assembly tripod.

- (4) Three legs are necessary to provide a foundation for the adapter assembly tripod (fig 10). One of the spare legs can be used to turn the range focus ring to assist in the range focal adjustments (fig 11). The base of the leg screws into a protrusion of the range focus ring. Certain models do not have an outlet in the range focus ring for the leg (TM 11-5850-228-13).

d. Accessories. Shipped and stored in the shipping container as accessories are one 6.75-volt

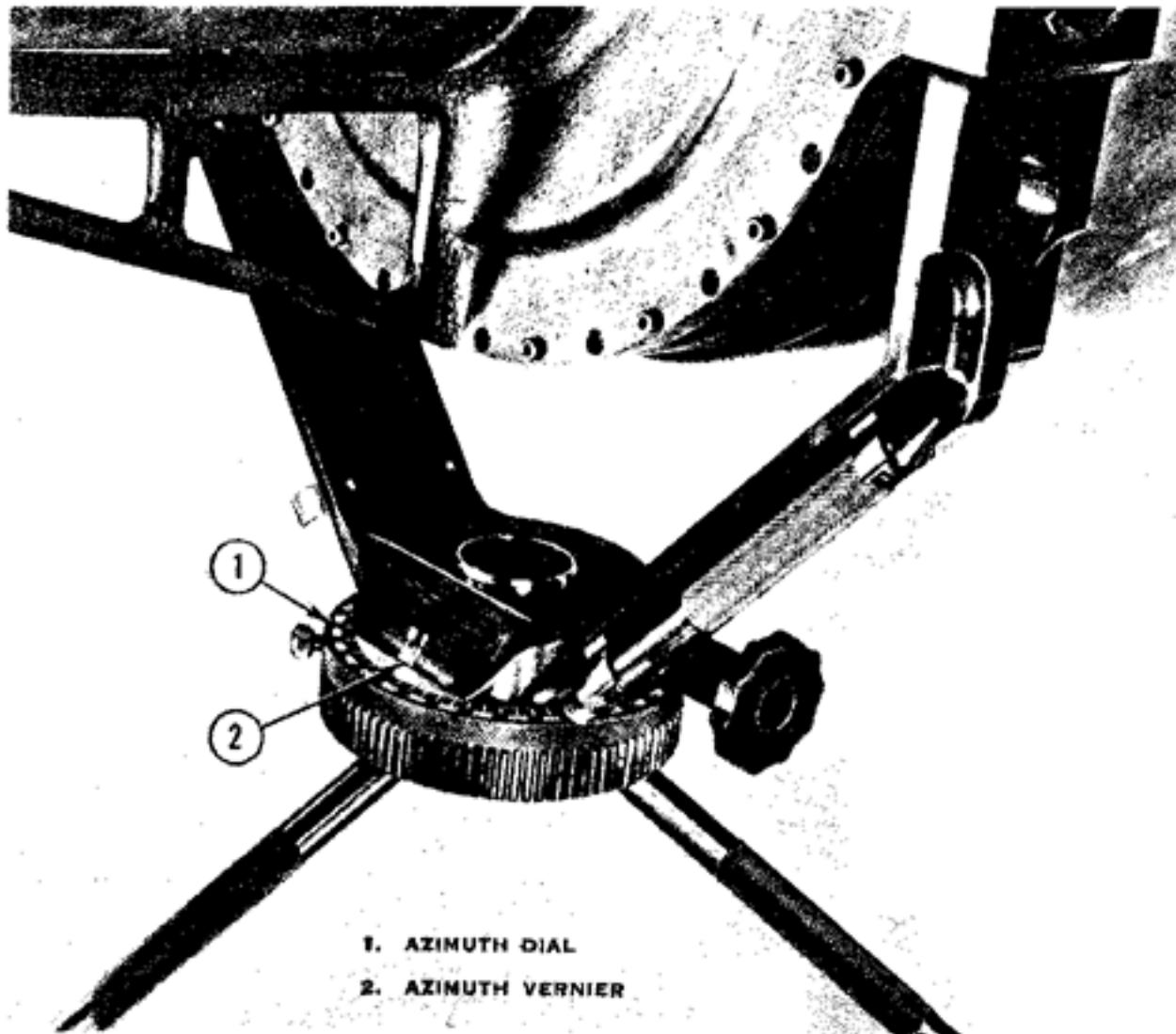


Figure 9. Azimuth dial and vernier.

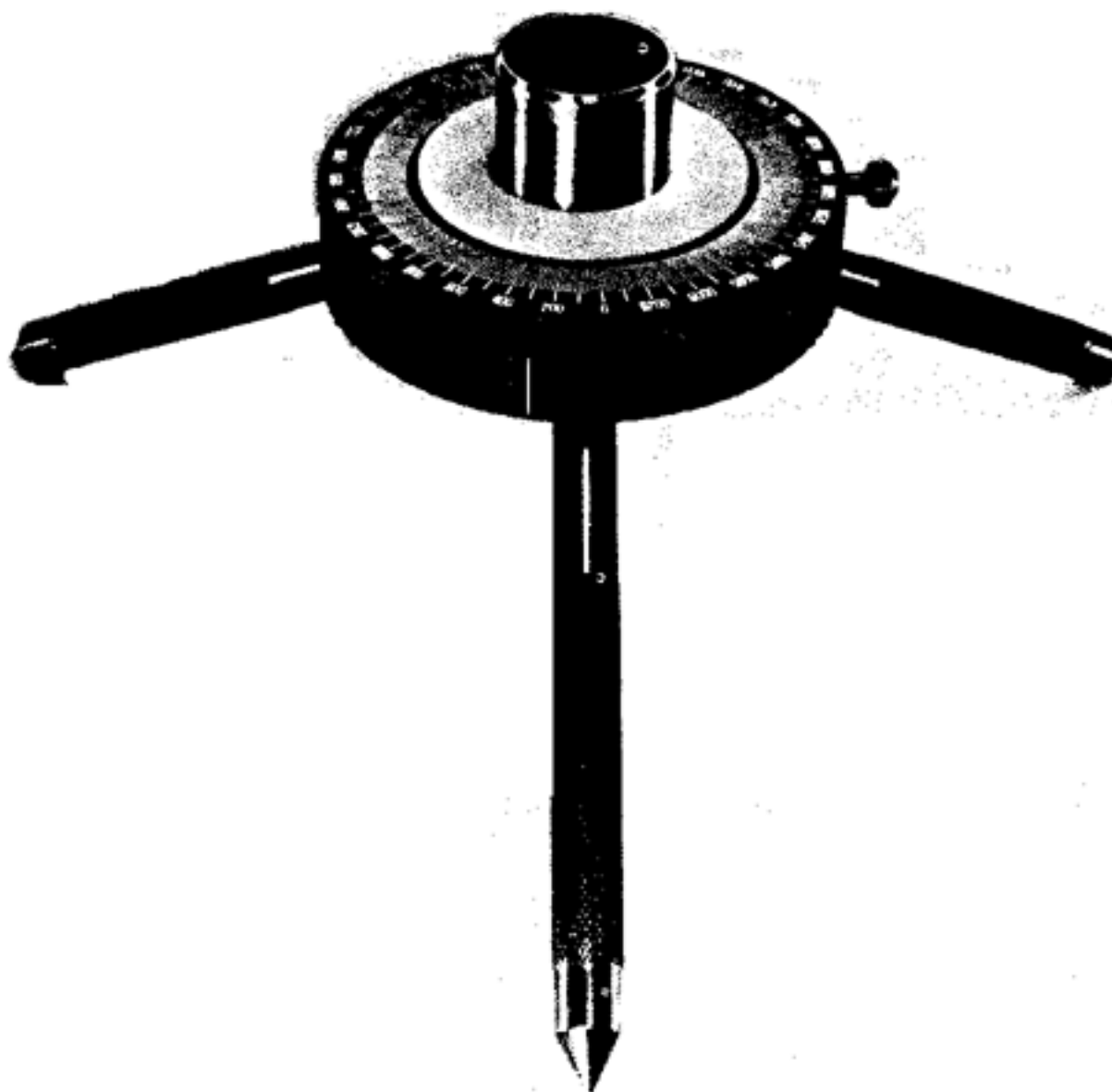


Figure 10. Adapter assembly tripod.

mercury cell battery, penlight, two penlight batteries, two spare legs, objective and eyepiece lens canvas covers, the technical manual, and a lens brush (fig 1).

- (1) Two 6.75-volt batteries are shipped with the NODMR; however, one is a spare. The battery does not have a recharging capability. When its use-life has been expended, the battery is discarded.

- (2) Two spare legs are packed to replace lost, or unserviceable legs.
- (3) Canvas covers for the objective lens and eyepiece assemblies are provided to protect the lens assemblies when the NODMR is not being used.
- (4) A penlight is provided to assist the operator in reading the azimuth and elevation dials and verniers at night (fig 12).



Figure 11. Range focusing using spare leg.

- (5) TM 11-5850-228-13 is provided for the operator and is kept in the lower cushion.
- (6) The lens brush is used by the operator to remove dust and other small particles from the outside of the objective and eyepiece lenses.

e. *Large Tripod.* The large tripod is a standard surveyor's tripod which has adjustable legs and enables the operator to level the NODMR.

.5. Tabulated Data.

a. *NODMR.*

- (1) Magnification - - - - 7 power.
- (2) Field of view - - - - 144 mils (average).
- (3) Eyepiece focus (original). +4 to -2.5 diop-
ters.
- (4) Eyepiece focus (modified). +4 to -4 diop-
ters.

- (5) Objective lens focus. 50 meters to maxi-
mum range for
the existing
conditions.
- (6) Weight (viewing
device and
yoke). 34 pounds.
- (7) Weight adapter
assembly. 16 3/4 ounces.
- (8) Weight adapter
assembly tri-
pod. 22 ounces.
- (9) Length (shade
not extended). 27.75 inches.
- (10) Length (shade
extended). 33 inches.
- (11) Width - - - - - 12.87 inches.

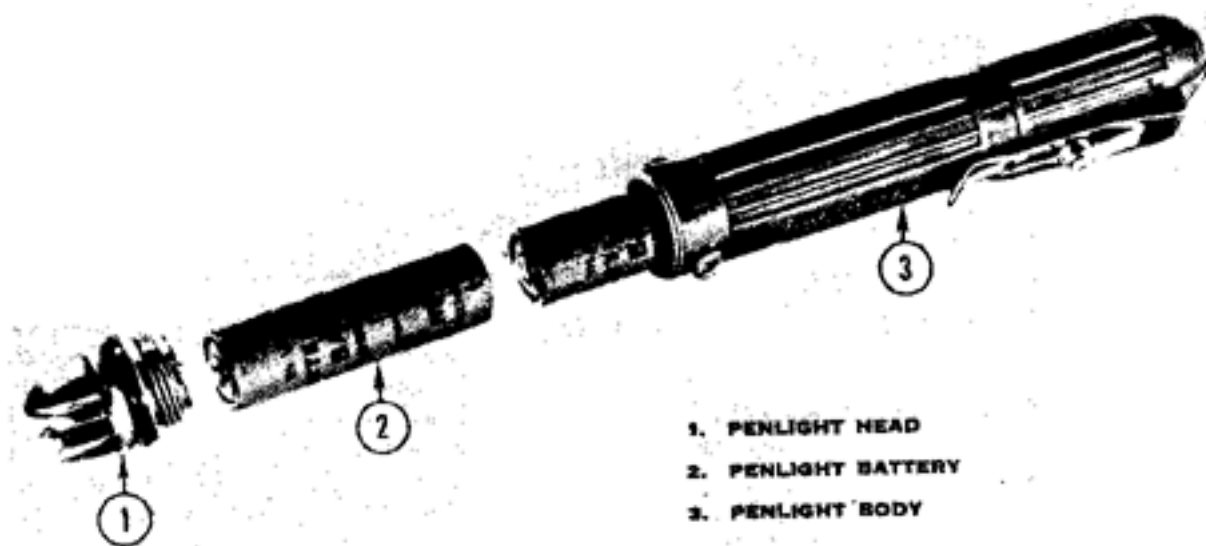


Figure 12. Penlight.

- | | | | |
|--|--|---------------------------------|--|
| (12) Height (adapter assembly tripod). | | (4) Use life ----- | Approximately 100 hours. |
| (13) Range ----- | Dependent on the available light and atmospheric conditions. | (5) Shelf life ----- | 2 years at optimum storage temperature of 70° F. |
| (14) Operating temperature. | -65° to + 125° F. at humidity ranging from 0 to 100 percent. | <i>c. Shipping Container.</i> | |
| (15) Elevation ----- | -640 to + 940 mils. | (1) Length ----- | 34 inches. |
| (16) Azimuth ----- | 6400 mils. | (2) Width ----- | 18 inches. |
| <i>b. Battery.</i> | | (3) Height ----- | 15 inches. |
| (1) Type ----- | BA1100 () -μ Mercury. | (4) Weight ----- | 22 pounds, 8 ounces |
| (2) Voltage ----- | 6.75. | <i>d. Large Tripod.</i> | |
| (3) Number of cells -- | 5. | (1) Height (legs not extended). | 36 inches. |
| | | (2) Height (legs extended). | 65 inches. |
| | | (3) Weight ----- | 12 pounds, 12 ounces. |

CHAPTER 2

MECHANICAL TRAINING

Section I. DISASSEMBLY AND ASSEMBLY

6. General. *a.* The purpose of mechanical training is to give the operator a knowledge of the basic functioning, controls, and adjustable parts of the NODMR and accessories so that he will understand its operation and be able to properly care for the equipment.

b. The operator is authorized to disassemble the NODMR *only* to the extent described in paragraph 7.

c. Even though detail disassembly is not authorized, this should not preclude teaching the operator the nomenclature of the component parts and accessories.

d. The NODMR should be disassembled and assembled only when necessary for instruction or maintenance.

7. DISASSEMBLY.

Caution: Before releasing the shipping container's latches, depress the core of the relief valve as instructed on the side of the shipping container (fig 13). This releases any internal pressure that may have built up during shipment and/or storage.

a. Shipping Container.

- (1) Place the shipping container flat on the ground, or table, and unlatch all 12 latches before removing the lid. Raise the latches to remove the lid from the bottom of the container.
- (2) Remove the NODMR viewing device, adapter assembly, NODMR batteries, penlight, penlight batteries, lens brush, and manual from the shipping container. Check the contents against the Basic Issue Items List contained in the manual. Report missing items to organizational maintenance.
- (3) The upper and lower foam cushions are force-fitted into the shipping container.

There are no screws or bolts holding them in place. The liners may be removed by forcefully pulling them from the shipping container.

b. Night Observation Device Medium Range. The operator may disassemble only the battery cap, battery cap O-ring, rubber eyeshield, and adapter assembly tripod legs.

- (1) Remove the battery cap from the battery housing by turning in a counterclockwise direction.
- (2) The battery cap O-ring can be slipped from the power supply housing after the battery cap has been removed.
- (3) The original rubber eyeshield is removed by gently grasping and unscrewing in a counterclockwise direction (fig 14). The diaphragm rubber eyeshield (fig 15) is removed by grasping the eyeshield and pulling outward.
- (4) To remove the legs from the clips on the yoke, grasp the legs and pull outward.

c. Penlight. Unscrew the penlight lamp head by turning counterclockwise to remove from the penlight body.

d. Remove the large tripod from the canvas carrying case. Remove the thread cover by turning counterclockwise. The thread cover must be removed before the adapter assembly can be mounted.

8. Assembly. The sequence in which the disassembled parts are assembled is not important; however, during training the operator should use the reverse procedure of disassembly.

a. Large Tripod.

- (1) Replace the thread cover on the top of the large tripod by screwing the cover clockwise on the tripod threads.

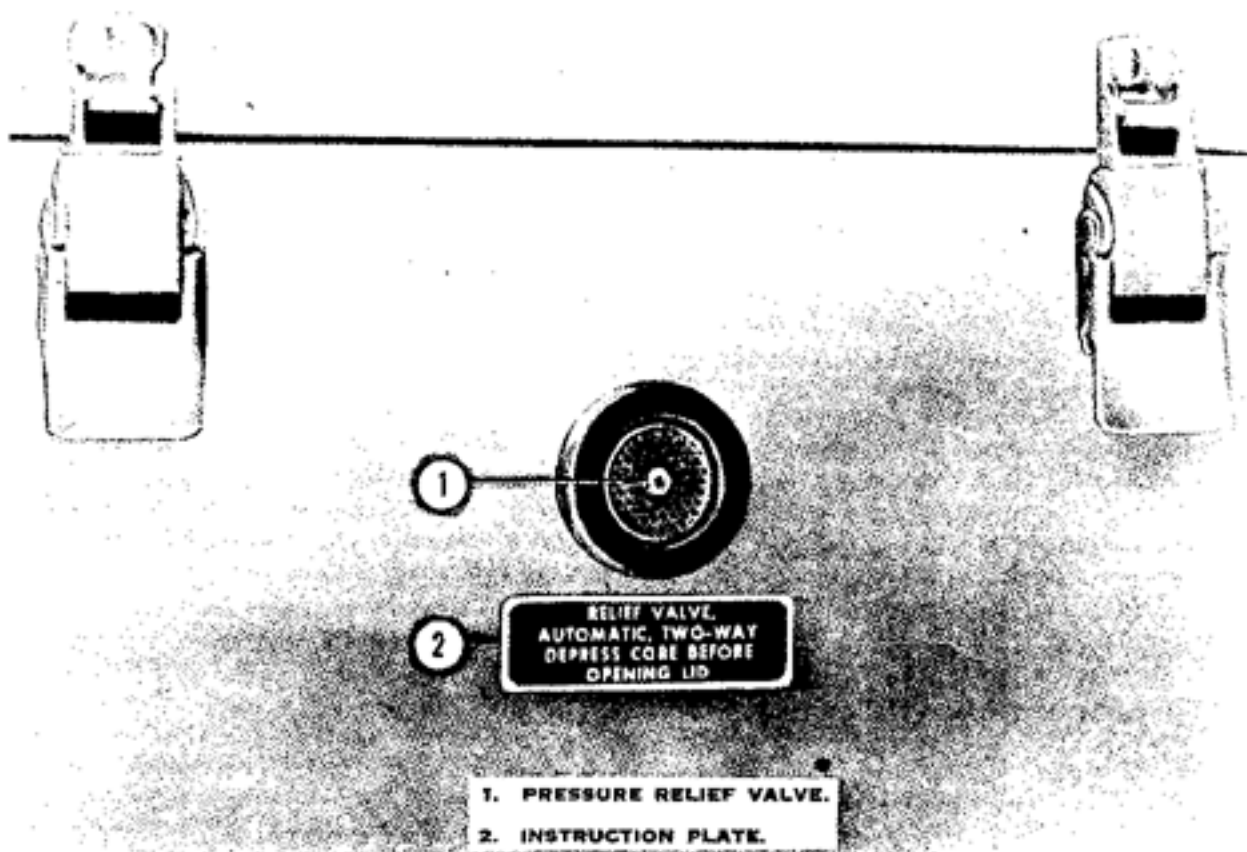


Figure 15. Pressure relief valve.

- (2) Replace the large tripod in the canvas carrying case.
- b. *Penlight*. Replace the lamp head by screwing clockwise onto the penlight body.
- c. *Night Observation Device Medium Range*.
 - (1) Replace the adapter assembly tripod legs in the clips on the yoke base by placing the long axis of a leg between two clips and pressing inward.
 - (2) Replace the rubber eyeshield by aligning the plastic threads on the forward end of

the eyeshield with the threads on the rear of the eyepiece assembly. Screw the rubber eyeshield clockwise onto the eyepiece assembly. Replace the diaphragm rubber eysshield by placing the eyeshield against the rear of the eyepiece assembly. Turn the diaphragm eyeshield clockwise while exerting forward pressure. The eyeshield is force fitted onto the eyepiece assembly and the forward pressure should allow the eyeshield to seat properly.



Figure 14. Removing rubber eyeshield.

- (3) Replace the battery cap O-ring onto the battery housing by slipping the ring over the housing threads.
- (4) Replace the battery cap by screwing clockwise onto the battery housing threads.

d. Shipping Container.

- (1) Insert upper and lower foam cushions in the shipping container.
- (2) Replace the NODMR and accessories in the shipping container.
- (3) Align the lid with the bottom of the shipping container and secure with latch and latch clasp.

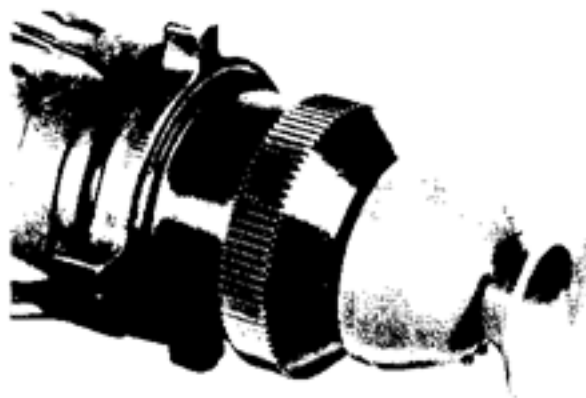


Figure 15. Diaphragm rubber eyeshield.

Section II. INSTALLATION, AND OPERATION AND FUNCTIONING

9. Installation. The NODMR should be set up on as level a surface as possible. The short tripod has no individual leg adjustments. The large tripod assembly has adjustable legs.

a. Adapter Assembly Tripod.

- (1) Remove the adapter assembly from the shipping container.
- (2) Remove the legs from the clips on the yoke.
- (3) Screw the legs clockwise in the hole

provided on the base of the adapter assembly (fig 16).

- (4) Set the adapter assembly tripod on a level surface.
- (5) Grasp the NODMR viewing device and yoke and lift from the shipping container.
- (6) Fit the bottom of the yoke over the top of the adapter assembly head. The opening in the base of the yoke normally fits snugly around the head of the

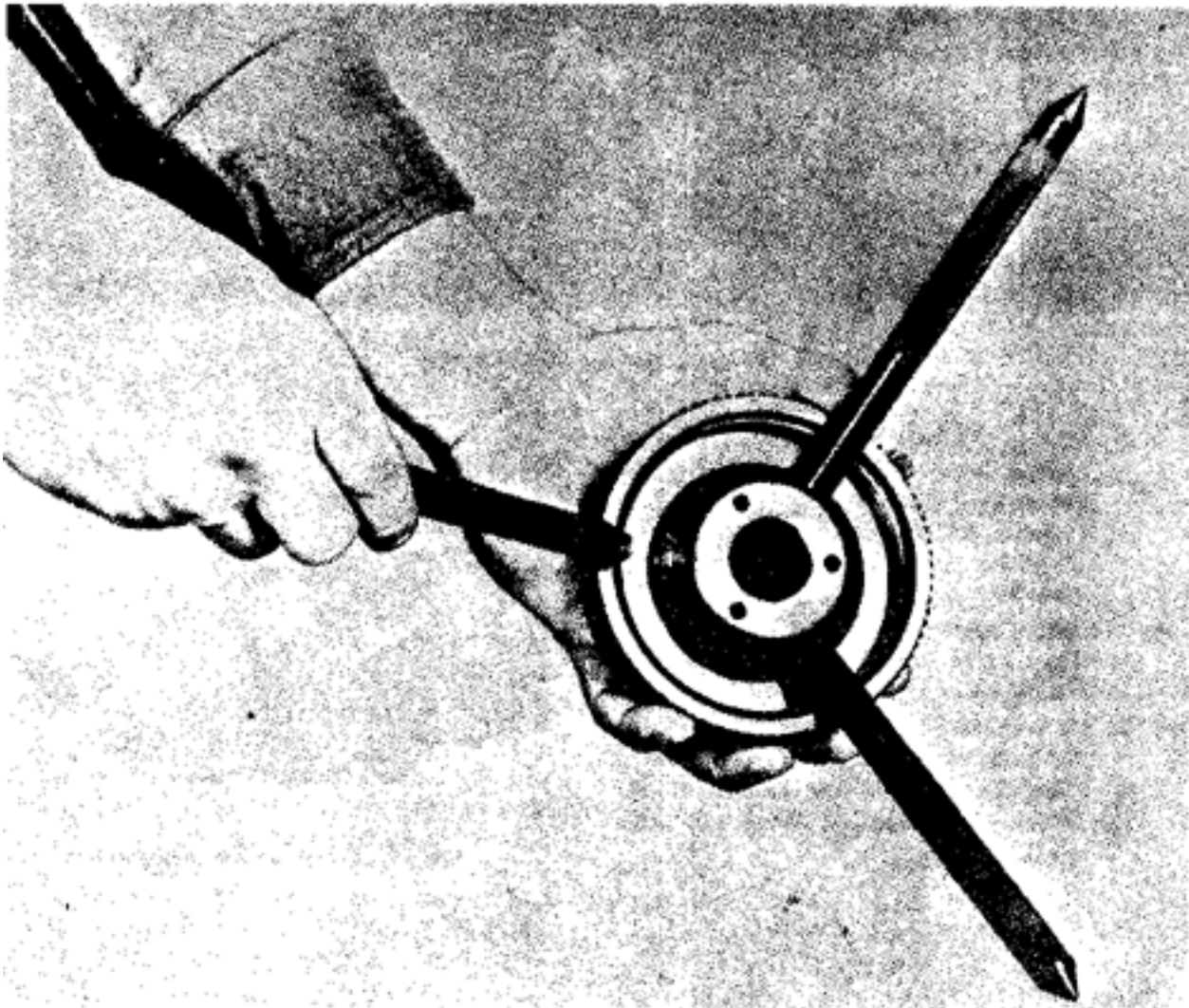


Figure 16. Installation of legs for adapter assembly tripod.

adapter assembly; therefore, the operator must insure he properly aligns the opening with the head assembly before setting the viewing device and yoke onto the head assembly. Care must be exercised during installation to prevent binding between the yoke opening and the head of the adapter assembly. Binding may cause equipment damage.

- (7) When the yoke is properly seated on the adapter assembly, rotate the viewing device and yoke to insure freedom of movement.
- (8) Figure 17 shows the NODMR on the adapter assembly tripod.

b. Large Tripod.

- (1) Remove the large tripod from the canvas carrying ease.

- (2) Loosen the six leg adjustment clamps and three leg locks, and extend the tripod legs. The legs are extended to meet the height requirements of the operator.
- (3) Tighten the leg adjustment clamps and leg locks.
- (4) Stand the large tripod on a level surface.
- (5) Remove the thread cover and place the cover in the shipping container.
- (6) Remove the adapter assembly from the shipping container and screw the assembly on the top of the large tripod by turning clockwise.
- (7) Remove the NODMR from the shipping container and fit the bottom of the yoke assembly over the top of the adapter assembly. Care must be exercised to prevent binding (a(6) above).

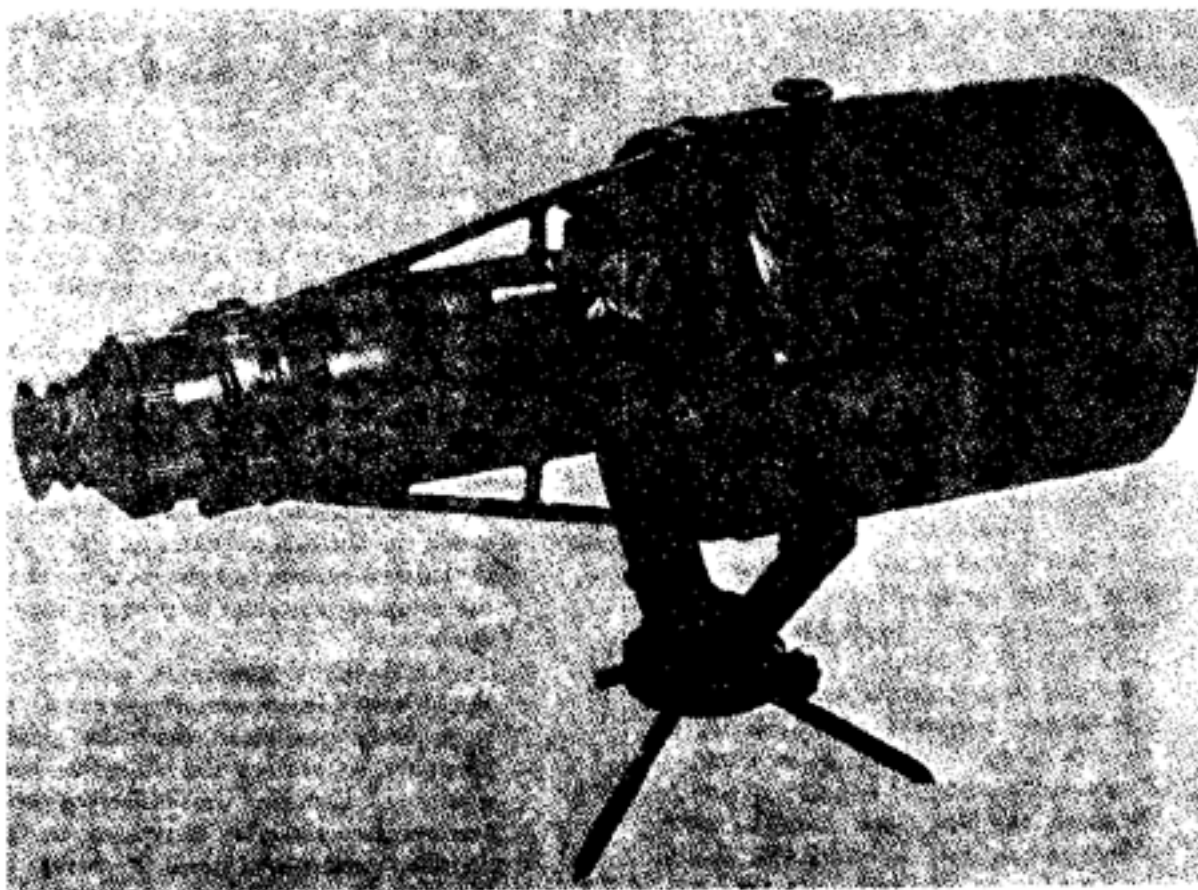


Figure 17. NODMR on adapter assembly tripod.

(8) The level bubble on the image tube housing assembly can be used to assist in leveling the large tripod. A cross level is not provided; however, the operator may achieve the same results by rotating the viewing device and leveling at various azimuths. If the large tripod is not level, the leg adjustment clamps must be loosened and the inner leg on the appropriate tripod leg must be adjusted for the proper length. If only minor adjustments are necessary, loosen the leg locks and move the legs. This will change the height slightly, but possibly may prevent adjustments with the leg adjustment clamps.

(9) Figure 18 shows the NODMR on the large tripod

10. Operation and Functioning. *a. General.* The Night Observation Device Medium Range, although designed to function under the most rugged conditions, is a precision electro-optical instrument and must be handled carefully.

b. Precaution. To prevent damage to the equipment and injury to himself, the operator should observe the following safety precautions:

- (1) **Caution: Never burn batteries as they will explode and the fumes from the mercury cells are harmful to the eyes, nose, and respiratory system. To dispose of batteries, bury or deposit in a large body of water.**
- (2) The NODMR should never be aimed directly toward the sun or intense light, whether the image intensifier tube is ON or OFF. This exposure can result in a complete failure of the image intensifier tube. When the image intensifier tube is exposed to bright light, it will automatically cut off to prevent burning of the tube and to protect the operator's eyes. Continuous exposure of an activated tube to bright light should be avoided. Since the lens should not be exposed in daylight, the lens cover must be used. When not in use, the NODMR should be stored in its shipping container.
- (3) When operating the NODMR, the operator should insure the rubber eyeshield is

positioned around the eye and against the face (para 4c(1)(g)).

c. Preoperational Inspection.

- (1) Open the shipping container as described in paragraph 7a(1) and remove the NODMR.
- (2) Visually inspect all external parts, surfaces, and threads for dust, cracks, chips, abrasions, or other damage. Insure that all dials and verniers are readable. Remove the objective lens and eyepiece covers and visually examine the objective lens and eyepiece assemblies for internal lens fogging or other signs of moisture. If protective lens tissue is packed in the rubber eyeshield, remove before operating the device. Turn the focus ring, range focus ring, yoke mount lock knob, and elevation lock knob to insure freedom of movement. Loosen the shade assembly lock knob and slide the objective shade assembly forward to insure the shade assembly slides smoothly. Slide the shade assembly to the rear and tighten the shade assembly lock knob.
- (2) Remove the adapter assembly from the shipping container and check the azimuth set screw for smooth operability. Loosen the set screw and turn the azimuth dial to test for free movement.
- (4) Remove the large tripod from the canvas carrying case and check the leg locks and leg adjustment clamps to insure operability. Loosen the leg locks and leg adjustment clamps to insure freedom of movement. Remove the thread cover and check the threads for damage. Place the thread and canvas carrying cash cover in the shipping container to prevent loss or damage.
- (5) During daylight operations, insure that the objective lens assembly canvas cover is properly positioned over the shade assembly to protect the objective lens assembly. Remove the objective lens and eyepiece assembly canvas covers for night operations and place the covers in the shipping container to prevent loss.

d. Operational Sequence. A definite sequence should be used when placing the NODMR in

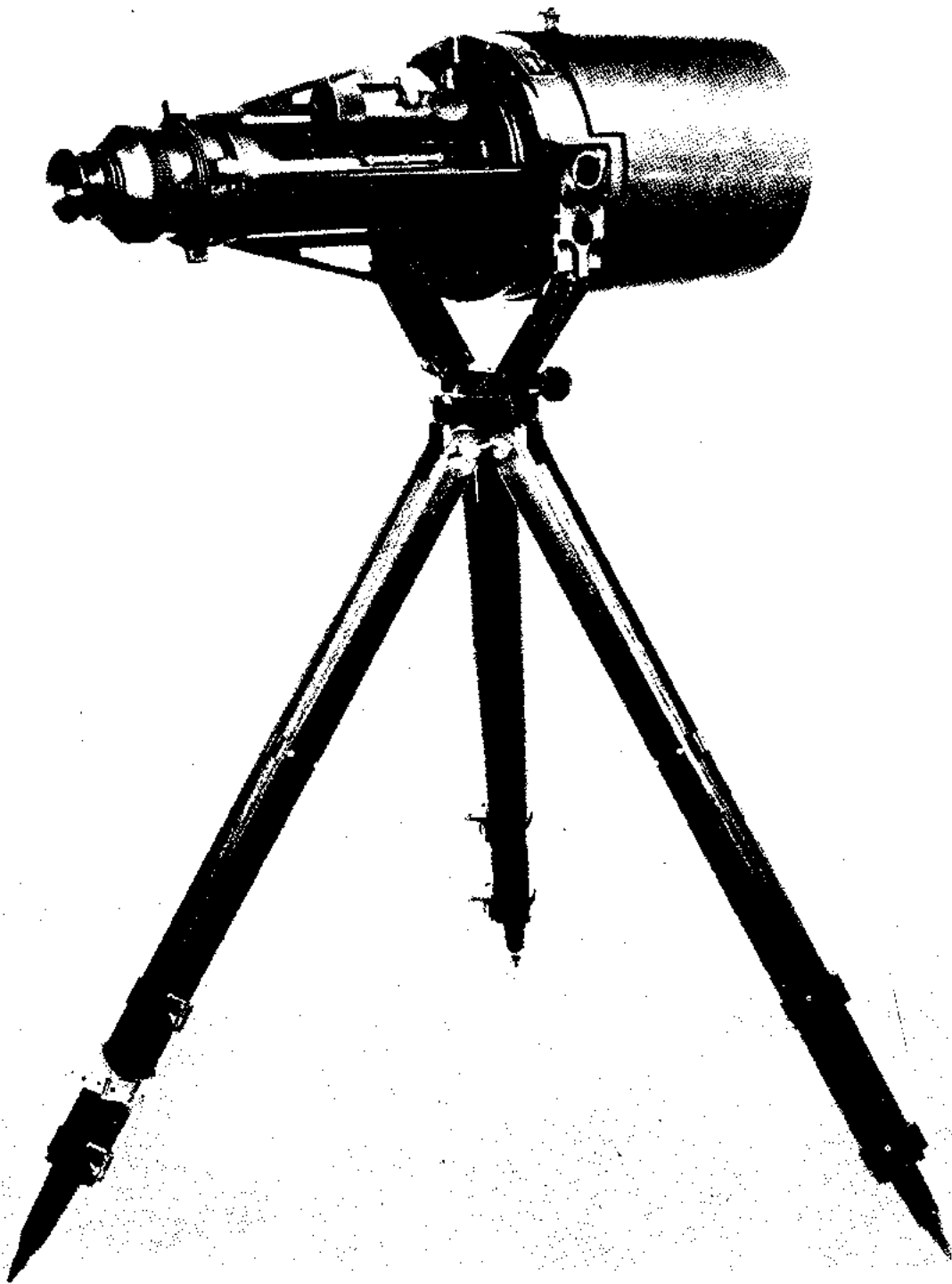


Figure 18. NODMR on large tripod.

TC 23-18

operation. This sequence should be continuously stressed with the new operator until it becomes second nature and automatic. Before placing the NODMR into operation it should be mounted on either the adapter assembly tripod or large tripod. The device can be placed into operation without being mounted on a tripod; however, to add stability and to insure against damage, all precautions should be taken to protect the equipment.

- (1) Installation on adapter assembly tripod, paragraph 9 a.
- (2) Installation on the large tripod, paragraph 9 b.
- (3) Installation of the battery.
 - (a) Push the switch guard down to insure the power switch is in the off position.
 - (b) Remove the battery cap as described in paragraph 7 b (1).
 - (c) Remove a BA11001 () Mercury cell battery from the shipping container and insert the battery, positive end

first, into the battery housing (fig 19). To identify the positive end, note the (+) or (-) markings on opposite ends of the battery. Should it be necessary to install a battery during the hours of darkness, the positive end can readily be identified by feeling for the "raised portion" located on the positive end of the battery.

- (d) Replace the battery cap as instructed in paragraph 8 c (4).
- (4) Position the rubber eyeshield around the eye.
 - (a) Raise the switch guard.
 - (b) Move the power switch to the ON position by pushing upward.
 - (c) Focus the eyepiece assembly by rotating the eyepiece focus ring until the reticle pattern is sharp and clear.
 - (d) Point the device at a distant target. Rotate the range focus ring either

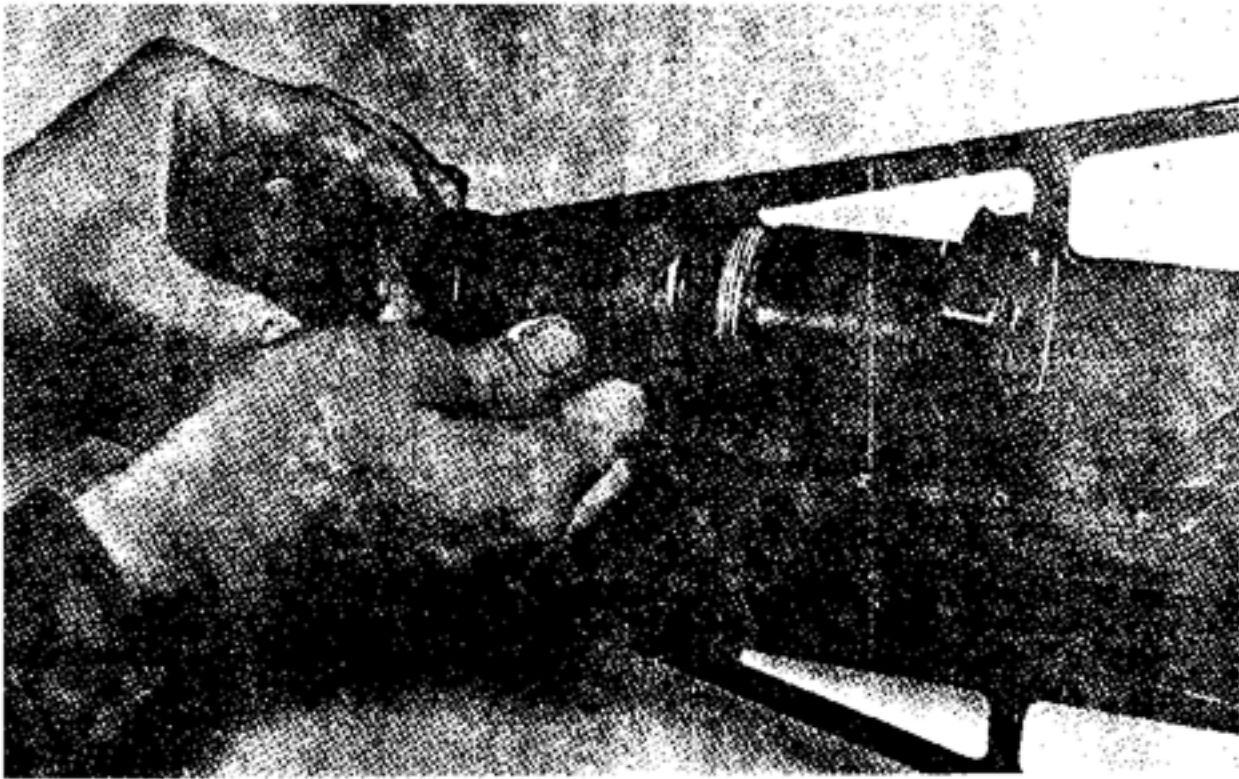


Figure 19. Battery installation.

clockwise or counterclockwise until the image being viewed is sharp and clear. To retain a sharp and clear image, it may be necessary to make an objective lens focal adjustment whenever the range between the NODMR and target changes.

- (e) After operation, push the switch guard down, which automatically pushes the power switch down, turning off the device.

Caution: When removing the rubber eyeshield from the eye, the operator must exercise care to prevent the visible light from illuminating his face or a portion of his body. When the NODMR is turned off, visible light will continue to be emitted from the eyepiece assembly for a few moments.

e. *Operation Under Unusual Conditions.*

- (1) *Extreme cold.* The power output of the mercury battery is greatly reduced in extremely cold temperatures. If the device fails to function properly the battery should be replaced. Possibly the the battery which is removed needs warming and can be used again. The operator can warm the battery by putting it in his pocket or inside his

shirt. The external surfaces of the lenses may have a tendency to fog or frost in cold weather and will require frequent clearing. The operator should avoid breathing into the rubber eyeshield as this will also increase fogging and frosting of the external surface of the eyelens.

- (2) *Extreme heat.* The NODMR is designed for satisfactory operation at temperatures up to 125° F.
- (3) *Dusty or sandy conditions.* The lenses will require frequent cleaning when used during these conditions. To prevent scratching of the lenses, remove most of the accumulated dust and sand with lens brush and use a soft lint-free cloth for thorough cleaning. When the NODMR is not in operation, install the objective lens assembly canvas cover to prevent damage to the objective lens.
- (4) *Rainy or humid conditions.* The NODMR is waterproof and will perform satisfactorily under these conditions. The external surfaces of the lenses may require frequent clearing.
- (5) The NODMR will operate satisfactorily at high altitudes without damage.

Section III. MAINTENANCE, TROUBLESHOOTING, AND DESTRUCTION

11. General. This section contains information on maintenance, troubleshooting, and destruction. The discussion on maintenance is confined to that information necessary for the operator to maintain the NODMR. For information concerning organizational and higher echelons of maintenance see TM 11-5850-228-13.

12. Tools and Equipment. There are no tools packed in the shipping container for operator maintenance. Due to the limited nature of operator maintenance, tools are not needed.

13. Care and Cleaning. a. *General.* To insure that the NODMR is ready for operation at all times, inspect it systematically to discover and correct defects before serious damage or failure results. Note defects during operation and insure appropriate corrective action is taken upon com-

pletion of operation. All defects, deficiencies, and corrective action taken will be recorded on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest opportunity.

b. *Special Instructions.*

- (1) Clean the exposed glass surfaces of the objective and eyepiece lenses by removing loose dirt with the lens brush, and then clean the glass surfaces with lens tissue. Dampen the lens tissue with water if necessary (distilled water if available).
- (2) Clean all exposed metal surfaces with a cloth. Dampen the cloth with water if necessary.
- (3) No lubricating materials are required by the operator for maintenance.

c. *Daily Preventive Maintenance.* The operator should perform the following daily preventive maintenance:

- (1) Inspect and service the shipping container for dirt, dents, holes, damaged latches, latch clasps, missing parts, identification and instruction plates, and for movability of the pressure relief valve. If unserviceable, replace the shipping container.
- (2) Remove the NODMR and accessories from the shipping container and inspect the upper and lower foam cushion liners for tears, dirt, and water-soaked condition. Remove loose dirt with a soft brush and clean with a damp cloth. Replace the liners if damaged.
- (3) Inspect and service the objective and eyepiece canvas covers for holes, tears, dirt, and water-soaked condition: If damaged or mildewed, replace.
- (4) Inspect and service the NODMR viewing device for dents, cracks, and loose or missing parts. Tighten the loose parts and report missing or damaged parts to organizational maintenance.
- (5) Inspect and service the objective and eyepiece lenses for dirt, dust, cracks, scratches, and signs of internal fog or moisture. If lenses are scratched, cracked,

and fogging or moisture appears, report the condition to organizational maintenance.

- (6) Examine all external parts of the adapter assembly for dirt, damaged, loose, or missing parts. Report damaged or missing parts to organizational maintenance.
- (7) Inspect the batteries for cracks and/or corrosion. Replace if faulty.
- (8) Inspect the exterior of the oscillator cap for dirt, cracks, and dents. DO NOT remove the oscillator cap from the oscillator housing. Clean the outside surfaces only. Report damaged oscillator cap to organizational maintenance.
- (9) Inspect the rubber eyeshield for dirt, oil, flexibility, and damage. Remove the eyeshield if dirty or damaged. Clean with a damp cloth. Replace damaged eyeshield.
- (10) Inspect the instructional manual for torn and missing pages. Replace if incomplete.

14. Troubleshooting. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the NODMR and its components. Each trouble symptom is followed by a list of probable causes. The possible remedy recommended is described opposite the probable cause.

TROUBLESHOOTING GUIDE

<i>Probable cause</i>	<i>Possible remedy</i>
a. Objective Shade Binds or Will Not Slide.	
(1) Bent or damaged objective shade assembly.	(1) Report to organizational maintenance.
(2) Bent or damaged baffle.	(2) Report to organizational maintenance.
(3) Faulty objective shade lock knob assembly.	(3) Report to organizational maintenance.
(4) Damaged objective lens assembly.	(4) Report to organizational maintenance.
b. Image Tube Housing Will Not Swivel on Trunnions.	
(1) Elevation lock knob damaged.	(1) Report to organizational maintenance.
(2) Dirt or sand accumulated between trunnion and yoke.	(2) Report to organizational maintenance.
(3) Yoke or trunnion damaged.	(3) Report to organizational maintenance.
(4) Image tube housing damaged.	(4) Report to organizational maintenance.
c. Weak or No Illumination of Image Intensifier Tube.	
(1) Weak or defective battery.	(1) Replace battery.
(2) Defective oscillator.	(2) Report to organizational maintenance.
(3) Defective image tube.	(3) Report to organizational maintenance.
(4) Defective power switch.	(4) Report to organizational maintenance.

<i>Probable cause</i>	<i>Possible remedy</i>
(5) Defective battery cap.	(5) Replace battery cap.
(6) Damaged eyepiece assembly.	(6) Report to organizational maintenance.
(7) Defective battery tension spring.	(7) Report to organizational maintenance.
<i>d. Image Blurred.</i>	
(1) Objective lens dirty or fogged (external).	(1) Clean lens.
(2) Eyepiece lens dirty or fogged (external).	(2) Clean lens.
(3) Objective lens out of focus.	(3) Adjust range focus ring.
(4) Eyepiece out of focus.	(4) Adjust focus ring.
(5) Weak battery.	(5) Replace battery.
(6) Defective oscillator.	(6) Report to organizational maintenance.
(7) Defective image tube.	(7) Report to organizational maintenance.
(8) Defective objective lens assembly.	(8) Report to organizational maintenance.
(9) Damaged eyepiece assembly.	(9) Report to organizational maintenance.
(10) Damaged image focusing tube.	(10) Report to organizational maintenance.
<i>e. Range Focus Ring will Not Rotate.</i>	
(1) Dirt or sand accumulated around range focus ring.	(1) Report to organizational maintenance.
(2) Range focus ring stop has slipped.	(2) Report to organizational maintenance.
(3) Defective range focus ring.	(3) Report to organizational maintenance.
<i>f. Eyepiece Will Not Focus.</i>	
(1) Dirt or sand accumulated around focus ring assembly.	(1) Clean around focus ring.
(2) Defective eyepiece assembly.	(2) Report to organizational maintenance.
<i>g. Yoke Will Not Mate With Adapter Assembly.</i>	
(1) Yoke damaged.	(1) Report to organizational maintenance.
(2) Adapter assembly damaged.	(2) Report to organizational maintenance.
<i>h. Yoke Mount Lock Knob Will Not Hold.</i>	
Yoke mount lock knob, stud lock, or roll pin damaged.	Report to organizational maintenance.
<i>i. Azimuth Did Will Not Turn on Adapter Assembly.</i>	
(1) Dirt or sand accumulated around vernier.	(1) Clean adapter assembly.
(2) Set screw damaged.	(2) Replace adapter assembly.
(3) Bent azimuth dial.	(3) Replace adapter assembly.
<i>j. Adapter Assembly Will Not Mount on Large Tripod.</i>	
(1) Damaged adapter assembly.	(1) Report to organizational maintenance.
(2) Dirt or sand accumulated inside threads.	(2) Clean adapter assembly and/or tripod threads.
(3) Damaged large tripod.	(3) Report to organizational maintenance.
<i>k. Legs Will Not Fit Into Adapter Assembly.</i>	
(1) Damaged threads on legs.	(1) Replace legs.
(2) Dirt in threads.	(2) Clean threads.
<i>l. Leg Will Not Engage in Range Focus Ring.</i>	
(1) Dirt or grit around threads.	(1) Clean threads.
(2) Damaged leg threads.	(2) Replace leg.
(3) Damaged range focus ring threads.	(3) Report to organizational maintenance.
<i>m. Large Tripod Legs Bind or Will Not Unfold.</i>	
(1) Leg lock knobs not loosened.	(1) Loosen leg locks.
(2) Dirt or sand between leg locks and legs.	(2) Clean tripod legs and leg locks.
(3) Tripod legs defective.	(3) Report to organizational maintenance.

<i>Probable cause</i>	<i>Possible remedy</i>
<p><i>n. Large Tripod Legs Will Not Extend.</i></p> <p>(1) Adjustment clamps are not loosened.</p> <p>(2) Dirt between leg and leg extension.</p> <p><i>o. Yoke Will Not Pivot.</i></p> <p>Defective trunnions.</p> <p><i>p. Shipping Container Will Not Latch.</i></p> <p>(1) Dirt or grit around latches.</p> <p>(2) Incorrect packing of equipment.</p> <p>(3) Defective shipping container cushions.</p> <p>(4) Damaged shipping container.</p>	<p>(1) Loosen adjustment clamps.</p> <p>(2) Clean leg and leg extension.</p> <p>Report to organizational maintenance.</p> <p>(1) Clean latches.</p> <p>(2) Repack equipment.</p> <p>(3) Replace shipping container cushions.</p> <p>(4) Replace shipping container.</p>

15. Destruction To Prevent Enemy Use. a

General. Destruction of the NODMR and related material, when subject to capture or abandonment in the combat zone, will be undertaken by the using unit when, in the judgment of the unit commander, such action is necessary in accordance with the unit's mission, or policy established by the commander concerned. If at all possible, the NODMR should be evacuated. When the commander concerned considers it necessary, he orders the NODMR's destruction to prevent one or more of the following:

- (1) Capture by the enemy.
- (2) Abandonment in the combat zone..
- (3) To deprive the enemy intelligence agencies knowledge of its existence, functioning, or exact specifications.

b. Principles of Destruction.

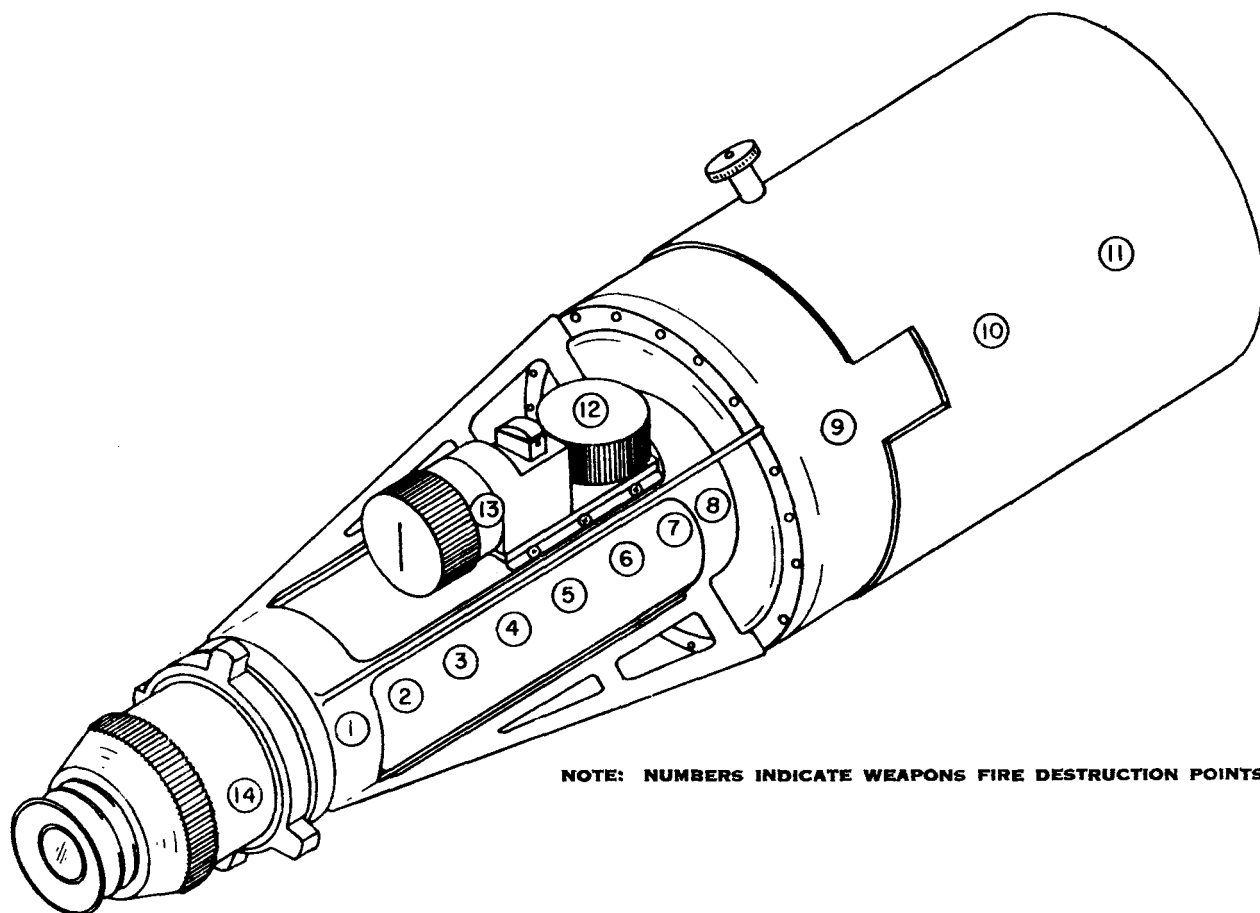
- (1) Destruction should be as complete as possible within limitations of time and equipment. In any event, the most important parts are destroyed or evacuated. The same essential parts are destroyed or evacuated in 'all' units to prevent the enemy from constructing one complete NODMR from several damaged ones. If time permits, dispose of damaged and partially destroyed equipment by throwing in nearby waterways, burying, and/or scattering the debris.
- (2) Personnel are trained in the prescribed methods of destruction and disposal.

c. Methods of Destruction.

- (1) *Weapons fire.* Destruction by weapons fire provides the fastest and safest method to destroy the NODMR. Fire several rounds through the side of the

NODMR viewing device attempting to hit the areas numbered on figure 20. The rounds should be fired into the device in the number" sequence marked, beginning with number one and going through number thirteen.

- (2) *Fragmentation hand grenade.* If time permits the NODMR should be destroyed by attaching a fragmentation hand grenade on the side of the image focusing tube and image tube housing assembly. The grenade should be attached as shown in figure 21, or on the opposite side near the battery cap. Either position should provide adequate destruction of the image intensifier tube, and as much of the objective lens and eyepiece assemblies as possible. Attach the grenade using the following steps:
 - (a) Secure a string or similar material between the fuze and top of the grenade body.
 - (b) Attach the string to the lower brace of the image tube housing assembly.
 - (c) Attach the string to the upper brace of the image tube housing assembly.
 - (d) Secure a string to the grenade base.
 - (e) Attach the string from the grenade base around the image tube housing assembly.
 - (f) Attach a wire, string, vine, rope or similar material to the pull ring of the grenade so the grenade can be remotely detonated from a safe distance.
 - (g) Straighten the ends of the grenade's safety pin which protrudes through the top of the fuze (fig 22). This



NOTE: NUMBERS INDICATE WEAPONS FIRE DESTRUCTION POINTS.

Figure 20. Weapons fire destruction.

allows the pin to be easily removed once the remote detonator is pulled.

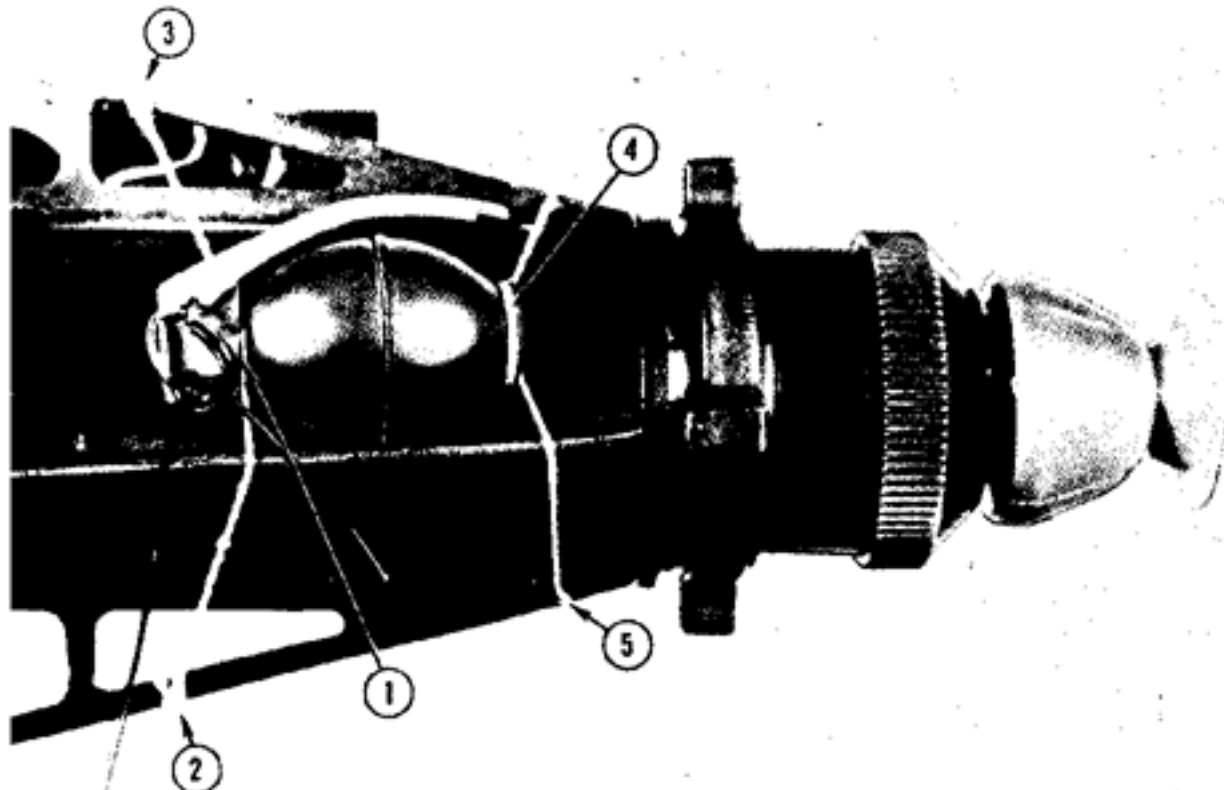
Caution: The grenade must be securely attached to the viewing device or there is a possibility the grenade body might be pulled from the NODMR before the grenade explodes. Personnel should also be reminded the fragmentation hand grenade has an effective casualty radius of 15 meters and fragments can be thrown as far as 200 meters.

- (3) *Mechanical.* This method of destruction should be used only when the weapon's fire and fragmentation hand grenade cannot be used. Smash the NODMR

viewing device with a suitable heavy object on the image focusing tube, eyepiece, objective lens, and power supply assemblies.

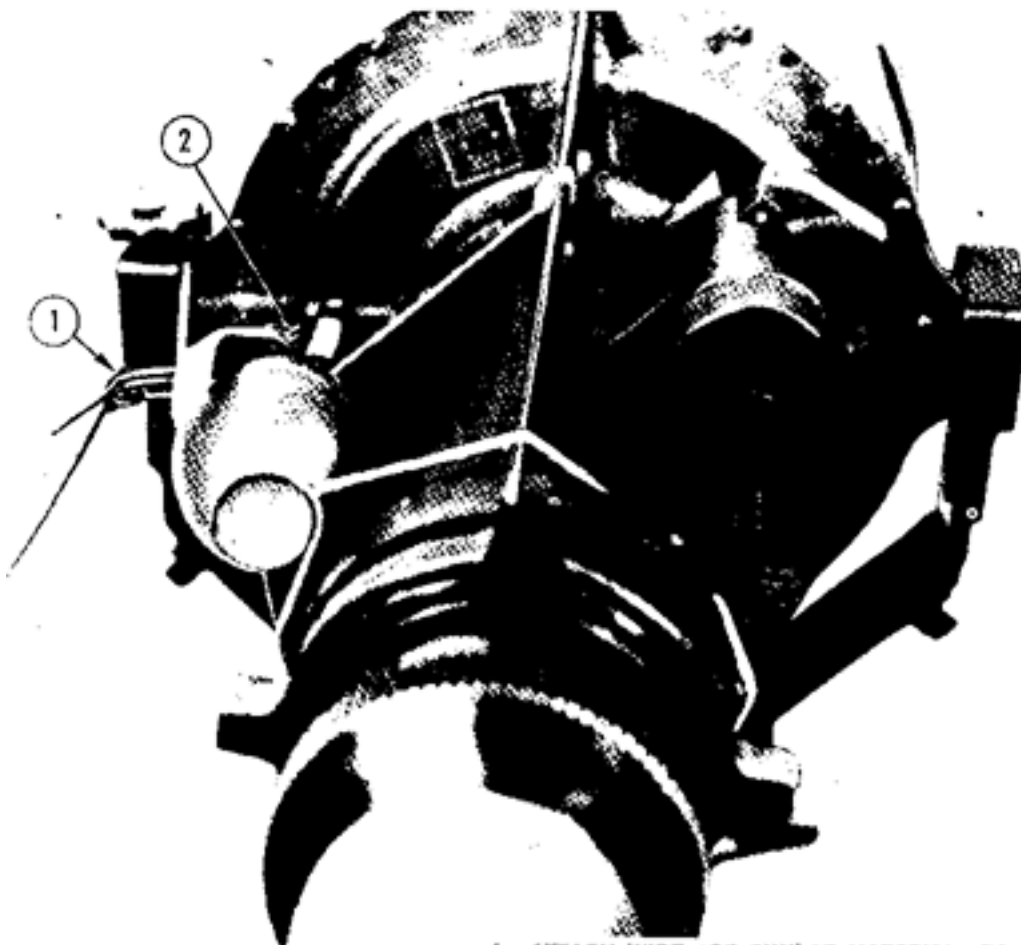
- (4) *Burn.* Burn as much of the equipment as is flammable. Use gasoline, oil, flame-thrower, and other comparable flame agents.

Caution: The operator should observe the safety precaution used when destroying the NODMR battery (para 10 b (1)). Additional precaution should be taken to prevent the personnel from inhaling or being exposed to the fumes from a damaged image intensification tube.



1. SECURE A STRING, OR SIMILAR MATERIAL BETWEEN THE FUZE AND TOP OF THE GRENADE BODY.
2. ATTACH THE STRING TO THE LOWER BRACE OF THE IMAGE TUBE HOUSING ASSEMBLY.
3. ATTACH THE STRING TO UPPER BRACE OF THE IMAGE TUBE HOUSING ASSEMBLY.
4. SECURE A STRING TO THE GRENADE BASE.
5. ATTACH THE STRING FROM THE GRENADE BASE AROUND THE IMAGE TUBE HOUSING ASSEMBLY.

Figure 21. Fragmentation hand grenade attached for remote detonation.



- 1. ATTACH WIRE (OR SIMILAR MATERIAL) TO PULL RING.
- 2. STRAIGHTEN SAFETY PIN.

Figure 88. Attachment for remote detonation of fragmentation hand grenade.

CHAPTER 3

OPERATOR TRAINING

Section I. INTRODUCTION

16. General. Operator training for the NODMR should be considered as a continuation of fire adjustment procedures for mortar and artillery personnel. Personnel with military occupational specialities (MOS) requiring operations and/or intelligence qualifications and the proper security clearance will receive training to supplement their knowledge of intelligence gathering methods. If the mortar and artillery personnel have mastered the fundamentals of target acquisition and fire

adjustment pertaining to their MOS, good results can be expected of fire adjustment at night.

17. Purpose. Operator training is designed to develop skills in orientation, detection, identification, recognition, and range estimation. Fire adjustment procedures should be developed so that the soldier can effectively employ the NODMR to place aimed fire, both direct and indirect, on an enemy at night.

Section II. PREPARATORY TRAINING

18. Operator Skills. Personnel using the NODMR should have the required security clearance and the proper MOS or a basic knowledge of forward observer procedures. Mortar and artillery personnel should be familiar with the adjustment of indirect fire for both daylight and darkness, and the knowledge to properly use an aiming circle, compass, and other supporting equipment. For preparatory training the operator should review the fundamentals of the applicable field manuals listed in appendix A.

19. Special Instructions. The operator should be taught the NODMR, as an optical instrument, requires special handling. When the NODMR is not being used, either in daylight or darkness, the canvas cover must be over the objective lens assembly to prevent damage to the image intensifier tube and to prevent possible disclosure of the equipment's position. The

NODMR *can be detected* by near infra-red equipment when a near infra-red light source is turned on and is pointed directly toward an exposed objective lens assembly.

20. Positions. Since the NODMR is too heavy for an operator to comfortably and effectively hold in his hands during operation, the adapter assembly tripod and large tripod have been provided. The operator will use the tripod which offers the desired flexibility and comfort.

a. The prone and standing are the primary positions (figs 23 and 24). The device can also be effectively used from a foxhole or other modified positions. Basic factors which affect the employment will also help determine the most practical operator viewing position.

b. If the NODMR is not employed on the adapter assembly tripod or large tripod, other body positions may be possible and appropriate.

Section III. ORIENTATION PROCEDURES

21. General. The NODMR may be installed during the hours of daylight or darkness. The operator may experience difficulty when attempting to use the NODMR just prior to darkness (dusk). The light level at dusk is still bright enough to cause the image intensifier tube to automatically cut off when the canvas cover is removed from the objective lens assembly.

22. Orientation. The NODMR can be oriented during the hours of daylight or darkness. Methods of orientation are:

a. Distant Aiming Point.

- (1) Place a stake or mark on the ground to use as a reference point.
- (2) From that point determine an azimuth to a distant aiming point with a compass or aiming circle. A close-in aiming point should also be selected to assist in reorientation when conditions would restrict the use of the primary distant aiming point.
- (3) Mount the NODMR directly over the reference point with one leg of the tripod pointed in the general direction of observation.
- (4) Rotate the viewing device and yoke assembly until the center horizontal line of the reticle pattern is aligned on the distant aiming point.
- (5) Loosen the azimuth set screw of the adapter assembly.
- (6) With the thumb and forefinger of the right and left hand, grasp the azimuth dial.
- (7) Rotate the azimuth dial until the compass azimuth has been indexed to the zero index of the vernier.
- (8) Tighten the azimuth set screw. The device is now oriented on the same

azimuth as the azimuth taken with the compass or aiming circle. When a target has been located, the azimuth to that target can be determined by reading it from the azimuth dial and zero line of the azimuth vernier.

b. Known Line.

- (1) Mark or construct a straight line (approximately 18 inches) on the ground, preferably with white tape or white string so that it is visible during darkness.
- (2) Determine the azimuth of that line using a compass or aiming circle.
- (3) Mount the tripod with the center of the tripod above one end of the line and one tripod leg on line with the known line.
- (4) Rotate the viewing device until the reticle pattern center is in line with the known line.
- (5) Loosen the azimuth set screw.
- (6) With the thumb and forefinger of either hand, grasp the azimuth dial.
- (7) Index the known azimuth on the zero index of the azimuth vernier.
- (8) Tighten the set screw. The instrument is oriented and the operator should be able to determine azimuths to his targets.

c. Known Azimuth. If an azimuth is known to a given point the observer can orient the reticle pattern of the viewing device on that point and index the known azimuth on the zero index of the vernier.

23. Reticle Pattern. The operator uses the reticle pattern to assist in determining the range to his targets and the distances to objects right and left of the observer target line. The operator may also use the appearance-of-objects method to make range determinations.



Figure 27. Front position.



Figure 24. Standing position.

CHAPTER 4

EMPLOYMENT CONSIDERATIONS

24. General. The purpose of the NODMR is to provide an efficient, secure viewing capability for friendly forces during the conduct of night operations. Although the NODMR does not give the soldier the width, depth, or clarity of vision enjoyed during daylight, he can see well enough to observe and adjust fire, observe the terrain, the enemy, his own forces, and perform numerous other tasks that confront a soldier in the field at night. Consideration of the factors affecting the employment and proper use of the NODMR will permit more effective execution of night offensive and defensive operation, aid in coordination and control within and between units, boost morale, and promote troops confidence. The employment of the NODMR is not limited to the uses described in this chapter.

25. Factors Affecting Employment. a. General. This paragraph discusses factors that may affect the employment of the NOD MR. The degree to which these factors aid or limit the operational capabilities of the device will vary depending on the illumination, weather conditions, operator fatigue, and the terrain over which the NODMR is being employed at that particular time of the night. Because the NODMR is an image intensification device, primary consideration should always be given to using both visible and infrared light from existing night vision devices to supplement the natural available light of the night sky.

(1) *Light.* Since the NODMR is designed to function using the available light of the night sky, the most effective operation can be expected under conditions of bright moonlight and starlight. As the available light level decreases, the viewing capabilities of the NODMR diminish proportionately. When the sky is overcast and the available light level is low,

the viewing capabilities of the NODMR can be greatly increased by the use of flares or illuminating shells on the flanks, left or right. Searchlights can be used to provide infrared or visible light. When the NODMR is employed with artificial illumination, the range and clarity of vision, are vastly superior to that experienced by the unaided eye under similar light conditions. Certain precautions must be taken to insure the artificial illumination is used properly. If the illumination is provided too far forward of the NODMR operator's position and at a very low altitude, the light may be more of a hindrance than an aid. The additional available light provided by artificial illumination can brighten the NODMR field of view where the operator cannot resolve his targets within the normal capabilities of the device. Factors such as wind drift, cloud cover, and associated atmospheric conditions should be evaluated to allow the artificial illumination to be placed at a sufficient altitude and appropriate position to prevent the light from becoming a distraction to the operator.

(2) *Weather.* Clear nights provide the most favorable operating conditions for the NODMR. Just as rain, sleet, snow, smoke, or fog affects the viewing capabilities of the individual, so will they affect the range capabilities of the NODMR. However, the NODMR can be expected to provide some degree of viewing capability in the most adverse weather conditions.

- (3) **Terrain.** To adequately describe the effects of terrain on the employment of the NODMR, it is necessary to approach the subject using different types of terrain under varying light conditions.
- (a) When viewing from open terrain into densely wooded areas, penetration of the woodline, even under the most favorable light conditions, is limited to a few meters. The operator will experience difficulty in detecting targets against a dark background.
- (b) When viewing from open terrain into sparsely wooded areas, penetration into woods is greatly improved depending on the depth of the woods, thickness of tree canopy, height and location of the moon, and the range of the NODMR to the woods.
- (c) When viewing from sparsely or densely wooded areas into open terrain, viewing capabilities are excellent. Operating under these conditions, the NODMR should not be employed at a depth inside the woods that would limit its field of view.
- (d) When operating the NODMR in various types of terrain, the operator may experience difficulty in depth perception and range estimation. This is a characteristic of the device. A terrain sketch, with ranges to identifiable objects, will assist the operator in range estimation.
- (e) When operating in open terrain, viewing capabilities are limited only by the available light and the range at which the NODMR and operator are capable of resolving a target.
- (f) When using the NODMR to view on or across rivers, streams, and lakes, the reflection of light off of the water provides maximum viewing capabilities.

b. Operator Eye Fatigue. New operators may initially experience eye fatigue after 5 to 10 minutes of continuous observation through the NODMR. After the operator has become accus-

tomed to using the device, he should be able to observe for longer periods of time with less difficulty. To aid in maintaining a continued viewing capability and to reduce eye fatigue, the operator may view with one eye and then the other.

26. Employment Considerations. The employment of the NODMR in night operations depends on the imagination of the operator and his commander. The initial general location is designated by the commander and the subordinate unit, leaders with the operators select the specific locations. The NODMR of the supporting forward observers should be positioned so that, the forward observers can best accomplish their mission of target acquisition and continuous surveillance of the battle area.

27. NODMR Positions. The NODMR should normally be located in areas free of vegetation which tends to reduce the range capabilities. If the unit's tactical plan will allow, the NODMR may be located near a command and/or observation post, radar site, or with reconnaissance and/or surveillance units. Special care should be taken to insure that the security of the NODMR is not compromised. The unit's tactical plan, both offensively and defensively, should insure that the NODMR's position is tied in with the disposition and employment of other surveillance devices and adjacent units. NODMR sites should have as many of the following characteristics as possible:

- a. Permit maximum coverage of the assigned area.
- b. Provide concealment for the equipment and operator.
- c. Facilitate communication with designated units.

28. Offensive Operations. The NODMR may be used to:

- a. Provide surveillance forward of the line of contact, or on an exposed flank.
- b. Provide surveillance over critical areas or avenues of approach to the objective.
- c. Assist in selecting targets for supporting weapons including mortars and artillery, and aid in the adjustment of fires.
- d. Determine the results of fires on a target.
- e. Assist in maintaining direction and in the control of attacking troops.

f. Detect natural or manmade obstacles designed to impede the advance of attacking units.

g. Assist patrols in night reconnaissance activities.

29. Defensive Operations. The NODMR may be used in night defensive operations to—

a. Allow early detection and placing of effective fires on an attacking enemy.

b. Detect and aid in the destruction of enemy patrols and infiltration teams.

c. Identify friendly patrols and aid in their passage through friendly lines.

d. Assist in selecting targets for direct and indirect fire weapons and to aid in the adjustment of these fires.

e. Aid in the location of casualties.

f. Promote the confidence of troops holding defensive positions by providing them with a night viewing capability.

g. Support the use of radar and other surveillance devices.

CHAPTER 5

NIGHT OBSERVATION DEVICE MEDIUM RANGE TRAINING COURSES

30. General. The NODMR operators' training courses as outlined in this chapter are designed to teach the soldier the fundamentals and basic skills required for operation of the NODMR. They are offered as a guide in preparing lesson plans and scheduling periods of instruction. Army Subject Schedule 23-18 and Security Requirements Checklist, appendix D, should be consulted for detailed information regarding the conduct of training and the security clearances required for each course. Ammunition requirements are listed in paragraph 33.

31. NODMR Operator's Training Course (5 Hours). This course consists of 1 hour devoted to conference, demonstration, practical exercises, characteristics, tabulated data, components, functioning, operation, disassembly and assembly, installation, orientation, and maintenance. The next hour consists of a practical exercise with operators required to detect, identify, recognize, and estimate ranges to various targets. The last 3 hours consist of range firing exercises where each

operator adjusts mortar or artillery fire on at least one target. The NODMR operators' training course should be given to personnel with a primary job description related to mortar or artillery fire adjustment.

32. NODMR Operator's Training Course Modified (3 Hours). The modified course should be primarily for operators using the device in a surveillance role as an intelligence gathering source. Reconnaissance and company or troop command and/or observation post personnel should be trained. Special skills or skill levels are not a prerequisite for attendance of the course. The first hour consists of a conference, illustration, demonstration, characteristics, tabulated data, components, accessories, operation, functioning, disassembly and assembly, installation, orientation, and maintenance of the NODMR. The second and third hours include practical exercises with operation required to detect, identify, recognize, and estimate ranges to various targets.

33. Ammunition Table.

NODMR Operator's Training Course

(Total rounds—122) (116 rounds for artillery or vehicular mounted mortars) (15 students)

Purpose	Type	Number of rounds	Range	Time limit
Settle base plate (ground mounted mortar).	HE.....	2 per mortar.....	(To be determined by firers).	None.
Adjustment.....	HE.....	6 per base piece only.....	2,000 meters or less.....	None.
Adjustment.....	Illumination.....	3 per base piece only.....	3,000 meters.....	None.
Demonstration.....	Illumination.....	1 per 3 students.....	3,000 meters.....	None.
Observation.....	HE.....	1 per student.....	2,000 meters or less.....	None.
Fire adjustment.....	HE.....	6 per student.....	2,000 meters or less.....	None.

34. Instructors' Notes. The NODMR operator's course is designed to train 15 students during a 3-hour firing exercise. Fifteen students should adequately accommodate the number of key personnel to be trained in one 4.2-inch mortar platoon or field artillery unit authorized observer sections. If additional personnel are to be trained, other nights must be scheduled. Three NODMRs will be required on one range for a 3-hour course for 15 students. Three mortars or artillery pieces and three supporting fire direction centers (FDC) will also be needed. The class will be divided into three groups of five students each. Each group, operating independently of the other, will have its own FDC and weapon to fire the mission. Each student will have an opportunity to see the effects of an illumination round within the NODMR's field of view. A student will be viewing through each of the three NODMRs when the illuminating rounds are fired. When the first round has burned

out, three different students will step forward and observe the second illumination round. With three students observing each illumination round, a total of five illumination rounds will be needed for the class demonstration. Following the illuminating demonstration, each student will have an opportunity to observe one high explosive round fired. This round is not considered as part of the students' ammunition allocation for fire adjustment, and is fired to give the student an idea of the effects of high explosive ammunition detonating forward of the NODMR. The round should be fired just prior to each student beginning his fire adjustment mission. A student will be viewing through each of the three devices throughout the practical exercise. Three minutes are allowed for each illumination round and 1 minute per order for the one round of high explosive used as an observation round. Twenty minutes will be allowed for each student to adjust a mission.

APPENDIX A

REFERENCES

1. Army Regulations (AR).

- 345-15 Safeguarding Nondefense Information.
 380-5 Safeguarding Defense Information.
 385-63 Regulations for Firing Ammunition for Training, Target Practice, and Combat.

2. Field Manuals (FM).

- 6-20-1 Field Artillery Tactics.
 6-20-2 Field Artillery Techniques.
 6-40 Field Artillery Cannon Gunnery.
 6-115 The Field Artillery Searchlight Battery.
 6-120 The Field Artillery Target Acquisition Battalion and Batteries.
 6-121 Field Artillery Target Acquisition.
 6-122 Artillery Sound Ranging and Flash Ranging.
 6-135 Adjustment of Artillery Fire by the Combat Soldier.
 6-140 Field Artillery Cannon Battalions and Batteries.
 6-160 Radar Set AN/MPQ-10A.
 6-161 Radar Set AN/MPQ-4A.
 6-162 Radar Set AN/TPS-25.
 7-11 Rifle Company, Infantry, Airborne, and Mechanized.
 7-20 Infantry, Airborne Infantry and Mechanized Infantry Battalions.
 7-30 Infantry, Airborne, and Mechanized Division Brigades.
 20-60 Battlefield Illumination.
 21-5 Military Training Management.
 23-20 DAVY CROCKETT Weapons System.
 23-85 60-mm Mortar, M1 9.
 23-90 81-mm Mortar, M29.
 23-92 4.2-Inch Mortar, M30.

3. Technical Manuals (TM).

- 9-258 Elementary Optics and Application to Fire Control Instruments.
 9-1900 Ammunition, General.
 9-6920-210-14 Operator, Organizational, and Field Maintenance Manual: Targets, Target Material, and Training Course Layouts.
 (O) 11-1090-268-15 Organizational, DS, GS, and Depot Maintenance Manual, Including Repair Parts and Special Tool Lists: Starlight Scope, Small Hand Held or Individual Weapons Mounted (FSN 1090-688-9954).
 (O) 11-1090-269-15 Organizational, DS, GS, and Depot Maintenance Manual, Including Repair Parts and Special Tool Lists: Crew-Served Weapon Night Vision Sight (FSN 1090-911-1370).

TC 23-18

- (O) 11-5850-228-13 Organizational and DS Maintenance Manual Including Repair Parts and Special Tool Lists: Night Vision Sight, Tripod Mounted.
- 11-5850-22845P GS and Depot Maintenance Repair Parts Night Vision Sight, Tripod Mounted.
- 4. Table of Allowances (TA).**
 - 23-100-6 Ammunition, Rockets, and Missiles for Unit Training-Active Army and Reserve Components.
- 5. Training Circulars (TC).**
 - 5-9 Near Infrared Night Vision and Detection Equipment and Its Application.
 - (0) 23-11 Starlight Scope, Small Hand-Held or Individual Weapons Mounted Model No. 6060.
 - (0) 23-13 Crew-Served Weapon Night Vision Sight.
- 6. Army Subject Schedules (ASubjScd).**
 - (0) 23-13 Crew-Served Weapon Night Vision Sight.
 - (0) 23-18 Night Observation Device, Medium Range.
 - (0) 23-39 Starlight Scope, Small Hand-Held or Individual Weapons Mounted, Model No. 6060.

APPENDIX B

SAFETY

1. General. Safety precautions must be observed during all firing exercises. This appendix lists the important precautions and references for conduct of this training, but is not intended to replace AR 385-63 or local range regulations. Range safety requirements to be followed will vary. It is mandatory, therefore, that the latest range safety directives and local range regulations be consulted to determine current safety requirements.

2. Safety Precautions. *a. General.* Prior to conducting range firing exercises, insure that AR

385-63 and manuals associated with the particular weapons system being used are thoroughly studied.

b. Special. When firing during the hours of darkness, the following special precautions apply:

- (1) A blinking red light must be used in addition to the red range flag displayed at the entrance of the range.
- (2) A check of the down range area will be made to insure all personnel and equipment are clear of the area.

APPENDIX C

ADVICE TO INSTRUCTORS

1. Purpose. This appendix is a guide for instructors. Its contents should not limit their initiative and originality.

2. Presentation. *a.* Instruction should be presented using explanation, demonstration, and practical application.

b. Each man's training must be closely supervised to insure a high standard of efficiency and coordination.

3. Training Objective. To provide the soldier with information in sufficient detail to enable him to effectively employ the NODMR in combat.

4. Assistant Instructors. Prior to instruction, train selected personnel as demonstrators and assistant instructors. Assistant instructors must be able to correct errors and answer questions pertaining to the training. To give the students a clear picture of the work under discussion, insure that demonstrators are trained and thoroughly rehearsed so that demonstrations are correct in every detail.

5. General Training Notes. *a.* The minimum time required to train a NODMR operator is 3 hours where the operator will not be adjusting mortar or artillery fire. The 5-hour course is recommended for mortar and artillery personnel. Training in tactics and techniques of employment should be covered during unit training.

b. Although the importance of mechanical and other phases of training should not be deemphasized, the importance of experience gained from target surveillance acquisition and range firing

exercises during the hours of darkness cannot be overemphasized.

c. Training aids for instruction may be constructed using the photographs and diagrams contained within this training circular as a guide. The training aids should be available in sufficient time to assure that all assistant instructors are thoroughly familiar with them.

d. During classroom presentations, the class may be divided into small groups under the direct supervision of an assistant instructor. The size of the groups will be dependent on the availability of the NODMR.

e. During daylight instruction, the canvas cover must be positioned over the objective lens to prevent damage to the image intensifier tubes.

6. Conduct of Training. Army Subject Schedule 23-18 should be used as a guide in preparing lesson plans and scheduling periods of instruction with the NODMR. The schedule of instruction and scope of training may be limited by the amount of time available, the duties of personnel to be trained, and the equipment, available.

7. Security. Since the NODMR is classified, adequate physical security measures in accordance with applicable Department of Defense and military department directives will be instituted during all operations with the NODMR. Appropriate regulations and the Security Checklist (app D) will be reviewed and adhered to during all NODMR operations. *Personnel using the NODMR are required to have at least a CONFIDENTIAL clearance.*

APPENDIX D

SECURITY REQUIREMENTS CHECKLIST FOR IMAGE INTENSIFIER NIGHT VISION EQUIPMENT

A. END ITEMS COVERED BY THIS CHECKLIST:

1. Starlight Scope, Small, Handheld or Individual Weapon Mounted.
2. Night Vision Sight, Crew-Served Weapons.
3. Observation Device, Night, Medium Range.
4. Observation Device, Night, Long Range.
5. Remote View System.
6. Binocular, Night Vision, Handheld.
7. Goggles, Night Vision.
8. All other military night vision equipment utilizing image intensifier tubes.

B. SYSTEMS: (Since the Image Intensifier Night Vision equipment is being produced in two generations it is necessary to show their classification separately.)

	<i>1st generation</i>	<i>2d generation</i>
1. Viewing system containing tube.....	C	C
2. Viewing system other than Remote View without tube.....	U*	C
3. Remote View System without tube.....	U	U
4. Individual parts (other than tube) peculiar to the system:		
a. Identified as part of system.....	U*	U*
b. Not identified as part of system.....	U	U
5. Information such as program documents, including phasing, funding, operating and command schedules.....	FOUO	FOUO
6. Graphic Information:		
a. Photographs, cutaways, sketches, drawings and electronic circuit drawings which reveal unique design details or manufacturing techniques.....	U*	C
b. Drawings of common parts such as retainer rings, eyeshields, lens housings, or mounting devices which do not reveal such details or techniques.....	U*	U*
c. Photographs, sketches or outline drawings such as side views of systems not weapon mounted which do not reveal such details or techniques.....	U*	C
d. Photographs showing systems mounted on or in connection with unclassified weapons or other military equipment.....	U*	C
e. Photographs of scenes taken through image intensifier systems.....	C	C
f. Specifications and procurement descriptions:		
(1) Revealing any classified information as herein described.....	C	C
(2) Not revealing classified information.....	U*	U*

*Not releasable for publication or public display.

	<i>1st generation</i>	<i>2d generation</i>
g. Inspection gauge pamphlets, supplemental quality assurance provisions, end item final inspection reports, not containing specific classified information.....	U*	U*
h. Maintenance packages, preliminary operating and maintenance manuals.....	U*	U*
i. Cost information:		
(1) Unit cost when related to item being produced:		
(a) R&D items.....	U*	C
(b) Production items.....	C	C
(2) Total cost when related to item being produced.....	U*	U*
(a) R&D contracts.....	U*	U*
(b) Production contracts.....	C	C
(c) Production contract identified by contract number only.....	U*	U*
j. Number of items being procured:		
(1) R&D contracts.....	U*	U*
(2) Production contracts.....	C	C
k. Production and delivery rates and schedules:		
(1) R&D contracts.....	U*	U*
(2) Production contracts.....	C	C
l. Total number in military inventory.....	C	C
m. Performance characteristics whether calculated, predicted or attained:		
(1) Range.....	C	C
(2) Brightness gain.....	C	C
(3) Resolution.....	C	C
(4) Contrast transfer.....	C	C
(5) Noise or background.....	C	C
n. Design details such as field of view, magnification, size and speed of optics, mounting techniques, reticle patterns, which do not reveal a tactical capability or imply a range or application.....	U*	U*
o. Military applications:		
(1) Tactical field applications, real or theoretical.....	C	C
(2) Unclassified weapons, vehicles or other military equipment on which used.....	U*	C
IMAGE INTENSIFIER TUBES:		
1. Cascade tube, 3 stage, electrostatic focused, single envelope (PIP III) ..	C	N/A
2. Cascade tube, fiber optic coupled, electrostatic focused (PIP I), one or more modules whether encapsulated or not	C	N/A
3. Advanced image intensifier tubes, such as channel, wafer, variable magnification, SEC Vidicon and photorelectronic.....	N/A	C
4. Intensifier tubes, nonmilitary types but containing classified components such as fiber optics or channel plates.....	C	C
5. Individual tube parts other than classified components such as fiber optics or channel plates.....	U	U
6. Fiber optics plates.....	C	C
(See Form DD254, Fiber Optics, dtd 20 Jul 64.)		

*Not releasable for publication or public display.

	<i>1st generation</i>	<i>2d generation</i>
7. Channel plates..... (See Form DD254 Microchannel Fab System dtd 10 Nov 64.)	N/A	C
8. Specialized manufacturing details or techniques responsible for unique performance or producibility.....	C	C
9. Information such as program documents, including phasing, funding, operating and command schedules.....	FOUO	FOUO
10. Graphic Information:		
a. Photographs, cutaways, mockups, sketches and drawings which reveal unique design details or manufacturing techniques.....	C	C
b. Not revealing such classified information.....	U*	C
11. Specifications and procurement descriptions:		
a. Revealing any classified information as herein described.....	C	C
b. Not revealing classified information.....	U*	U*
12. Performance characteristics whether calculated, predicted or attained:		
a. Brightness gain.....	C	C
b. Resolution.....	C	C
c. Contrast transfer.....	C	C
d. Cathode sensitivity.....	C	C
e. Noise or background.....	C	C
13. Cost information when related to item being procured:		
a. Unit cost:		
(1) R&D tubes.....	U*	U*
(2) Production tubes.....	C	C
b. Total cost when related to item being procured:		
(1) R&D tubes.....	U*	U*
(2) Production tubes.....	C	C
(3) Production contract identified by contract number only.....	U*	U*
c. Number of tubes procured:		
(1) R&D tubes.....	U*	U*
(2) Production tubes.....	C	C
d. Production and delivery rates and schedules:		
(1) R&D tubes.....	U*	U*
(2) Production tubes.....	C	C
e. Total number of tubes in military inventory.....	C	C
14. This checklist will be used as a guide in preparing DD Form 254, "Security Requirements Checklist."		

*Not releasable for publication or public display.

By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Distribution:

Active Army:

DCSPER (2)
DCSLOG (2)
DCSOPS (2)
Coa (1)
CRD (1)
CORC (2)
ACSFOR (2)
ACSI (2)
TIG (1)
CNGB (2)
CINFO (1)
CAR (2)

USCONARC (25)
USACDC (2)
ARADCOM (2)
ARADCOM Rgn (2)
MDW (1)
OS Maj Comd (10)
Armies (5)
corps (3)
Div (2)
Bde (1)
Inf Regt/Gp/Bg (1)

Inf Bn (1)
Inf Co (1) except
TOE 7-167 (None)
TOE 7-168 (None)
Inf Det (1)
USMA (2)
Svc Colleges (2)
Br Svc Sch (2) except USAIS (80)
USATC, Armor (20)
USATC, Inf (20)
USATC, AD (20)

NG: State AG (3); unit-same as active Army.

USAR: Same as active Army.

For explanation of abbreviations used, see AR 320-50