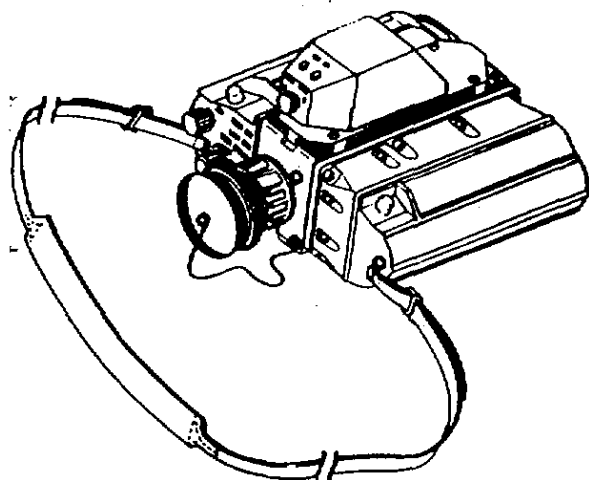


**OPERATOR'S  
MANUAL**



**Mini Eyesafe Laser  
Infrared Observation Set  
(MELIOS)  
AN/PVS-6  
(NSN 5860-01-350-8551)  
(EIC: N/A)**

<b>EQUIPMENT DESCRIPTION</b> Page 1-4
<b>CONTROLS AND INDICATORS</b> Page 2-1
<b>OPERATION UNDER USUAL CONDITIONS</b> Page 2-23
<b>OPERATOR MAINTENANCE</b> Page 3-1

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**HEADQUARTERS, DEPARTMENT OF THE ARMY  
1 SEPTEMBER 1995**



**5**

**SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK**

**1**

**DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL**

**2**

**IF POSSIBLE, TURN OFF THE ELECTRICAL POWER**

**3**

**IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL**

**4**

**SEND FOR HELP AS SOON AS POSSIBLE**

**5**

**AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION**

**WARNING**  
**Lithium**  
**Battery BA-6516/U**

**Battery BA-6516/U contains a gas under pressure. Do NOT heat, puncture, disassemble, short circuit or attempt to recharge, or otherwise tamper with battery. Turn off equipment if battery compartment becomes hot. Wait until battery has cooled before removing it. Lithium Batteries have safety vents to prevent explosion. When they are venting gas, you will smell gas, your eyes may become irritated, or you may hear the sound of gas escaping. , When safety vents have operated, batteries must still be handled with care. Return batteries to Defense Reutilization and Marketing Office for disposal in accordance with DOD Handbook 4160. 21-M.**

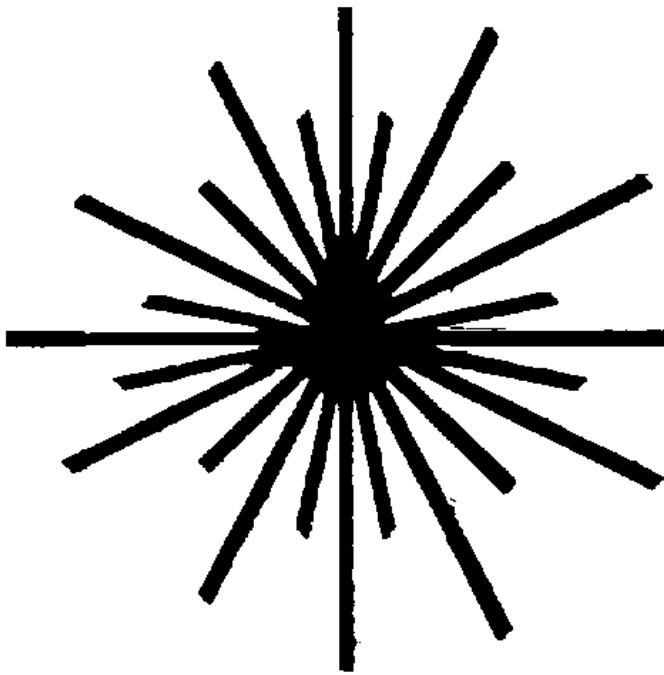
**B**

**WARNING**  
**Nickel Cadmium Battery**  
**BB-516/U**

Battery BB-516/U should be handled in the following manner: 1) Do NOT dispose of in fire. 2) Do NOT short circuit. 3) Return batteries to Defense Reutilization and Marketing Office for disposal in accordance with DOD Handbook 4160. 21-M.

C

**CAUTION  
DO NOT STARE INTO  
LASER EXIT PORT**



**DANGER**  
**LASER LIGHT**

**INVISIBLE LASER  
RADIATION**

**Wavelength = 1540 nm Energy = 20 mJ/pulse  
ANSI CLASS 3a LASER PRODUCT**

The AN/PVS-6 MELIOS Rangefinder incorporates a restricted eyesafe laser. This device may be used during any Force-On-Force training exercise.

**CAUTION**

The MELIOS, AN/PVS-6, is a restricted eyesafe laser system. It may be safely operated in the classroom and on "uncleared" training ranges. It may be used during Force-On-Force training, including being viewed directly through magnifying optics of opposing force systems. **DO NOT CHECK TO DETERMINE IF THE MELIOS IS OPERATIONAL BY LOOKING INTO THE LASER UNIT AND FIRING THE LASER.**

Technical Manual

No. 11-5860-202-10

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, DC, 1 September 1995

**Operator's Manual**

**MINI EYESAFE LASER INFRARED  
OBSERVATION SET  
(MELIOS)  
AN/PVS-6  
(NSN 5860-01-350-8551) (EIC: N/A)**

**REPORTING ERRORS AND  
RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LM-LT, Fort Monmouth, New Jersey 07703-5007.

In either case a reply will be furnished direct to you.

\*This manual supersedes TM 11-5860-202-10, dated 15 August 1993.

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## HOW TO USE THIS MANUAL

This manual is designed to help you operate the Mini Eyesafe Laser Infrared Observation Set (MELIOS) AN/PVS-6. Maintenance of the MELIOS is limited to procedures that do not require it to operate as part of a specific system. The front cover boxed entries are provided as quick reference to important information. Warning and caution pages are located in front of this manual. You should learn all warnings and cautions before operating this equipment.



## Chapter 1 Introduction

### Section I. General Information

#### 1-1. Scope

This manual is for use in operating and performing operator's maintenance on the Mini Eyesafe Laser Infrared Observation Set (MELIOS) AN/PVS-6.

#### 1-2. Consolidated Index of Army Publications and Blank Forms.

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

#### 1-3. Maintenance Forms, Records and Reports.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

b. Reporting of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140. 55/SECNAVINST 4355. 18/AFR 400-54/MCO 4430. 3J.

c. Transportation Discrepancy Report (TDR) (SF 361). Fill out and forward Transportation Discrepancy Report (TDR) (SF361) as prescribed in AR 55-38/NAVSUPINST 4610. 33C/AFR 75-18/MCO P4610. 19D/DLAR 4500. 15.

**1-4. Reporting Equipment Improvement Recommendations (EIR). -**

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-ED-CFO, Fort Monmouth, New Jersey 07703-5023. We'll send you a reply.

**1-5. Administrative Storage.**

Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with PMCS charts (Page 2-17) before storing. When removing equipment from administrative storage, the PMCS should be performed to assure operational readiness.

**1-6. Destruction of Army Material to Prevent Enemy Use.**

Destruction of Army electronic material to prevent enemy use shall be in accordance with TM730-244-2.

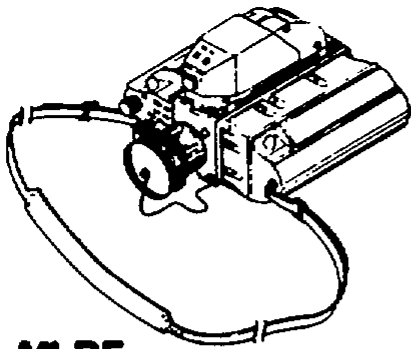
**1-7. Safety, Care, and Handling.**

Be sure to observe all warnings, cautions, and notes in this manual. Failure to follow these instructions could result in injury to personnel and/or damage to the equipment.

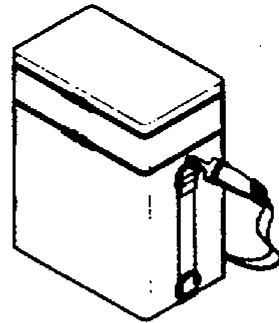
## Section II. Equipment Description

### 1-8. Characteristics.

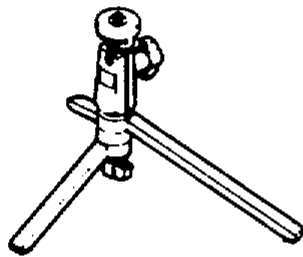
The Mini Eyesafe Laser Infrared Observation Set (MELIOS), AN/PVS-6, is a lightweight, individually operated, handheld or tripod-mounted, laser rangefinder. It is capable of determining ranges from 50 through 9995 meters in five meter increments and displaying the range in the eyepiece. Compass/Vertical Angle measurement (C/VAM) allows for an azimuth measurement and vertical angle measurement. The target azimuth is displayed 0. to 6395 mils or  $0^{\circ}$  to 3590 in the upper portion of the eyepiece display. Vertical angle is displayed from +530 mils or +30 degrees. The C/VAM can operate independently or at the same time as the rangefinder. The C/VAM operation is controlled by the MLRF Charge and Fire Switches. The AN/PVS-6 is capable of being used with the Night Observation Device, Long Range (NODLR) AN/UAS-11 (TM 11-5855-253-10).



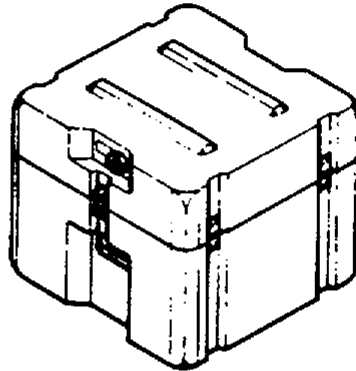
**MLRF**



**CARRYING CASE**



**TRIPOD**



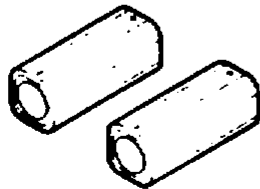
**SHIPPING CASE**



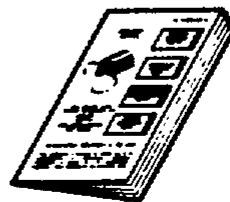
**LENS CLEANING  
COMPOUND**



**LENS CLEANING  
TISSUE**



**BATTERIES  
2 EACH**



**OPERATOR'S  
MANUAL**

*Figure 1-1. MELIOS System Components*

**1-9. Location and Description of Major Components (Figure 1-1).**

a. The MELIOS is made up of the following components: the MELIOS Laser Rangefinder (MLRF), C/VAM, Batteries BA-6516/U, a nonrechargeable-able Lithium Thionyl Chloride battery, or BB-516/U, a rechargeable sealed Nickel Cadmium battery (see Appendix A for battery charger technical manual), carrying case, shipping case, tripod, lens cleaning compound and cleaning tissue, and operator's manual.

b. The MLRF is the major component of the MELIOS. A ready indicator is provided in the eyepiece display. The range is displayed in the eyepiece for five seconds after the Fire Switch is released. The range value can be held in the display by holding the Fire Switch down after ranging on a target. A multiple target indicator and a low battery indication are also provided in the display in the eyepiece to show the operator the status of the equipment.

c. The C/VAM module gives the operator the additional capability to measure the azimuth and vertical angle to the target.

- d. The Carrying Case is used to carry the MLRF, batteries, lens cleaning compound, lens cleaning tissue, tripod, and operator's manual.
- e. The Tripod is used to provide a stable support for the MLRF.
- f. The Shipping Case is used to protect the MELIOS system in storage and during transportation.

**1-10. Equipment Data.**

Table 1-1 lists the electrical, environmental, and physical specifications of the MELIOS.

*Table 1-1. Equipment Data.*

<b>Characteristic</b>	<b>Specification</b>
Magnification	7X
Field-of-View	7
System Weight	6.5 lbs.
Batteries (two each)	BA-6516/U, Battery Non-rechargeable Lithium Thionyl Chloride or BB-516/U, Battery, Rechargeable, Sealed, Nickel Cadium
Operating Temperature	-26 F to + 120 F (-32 C to + 49 C)
Range Accuracy	± 5 meters
Azimuth Accuracy	± 10 mils
Vertical Angle Accuracy	± 10 mils



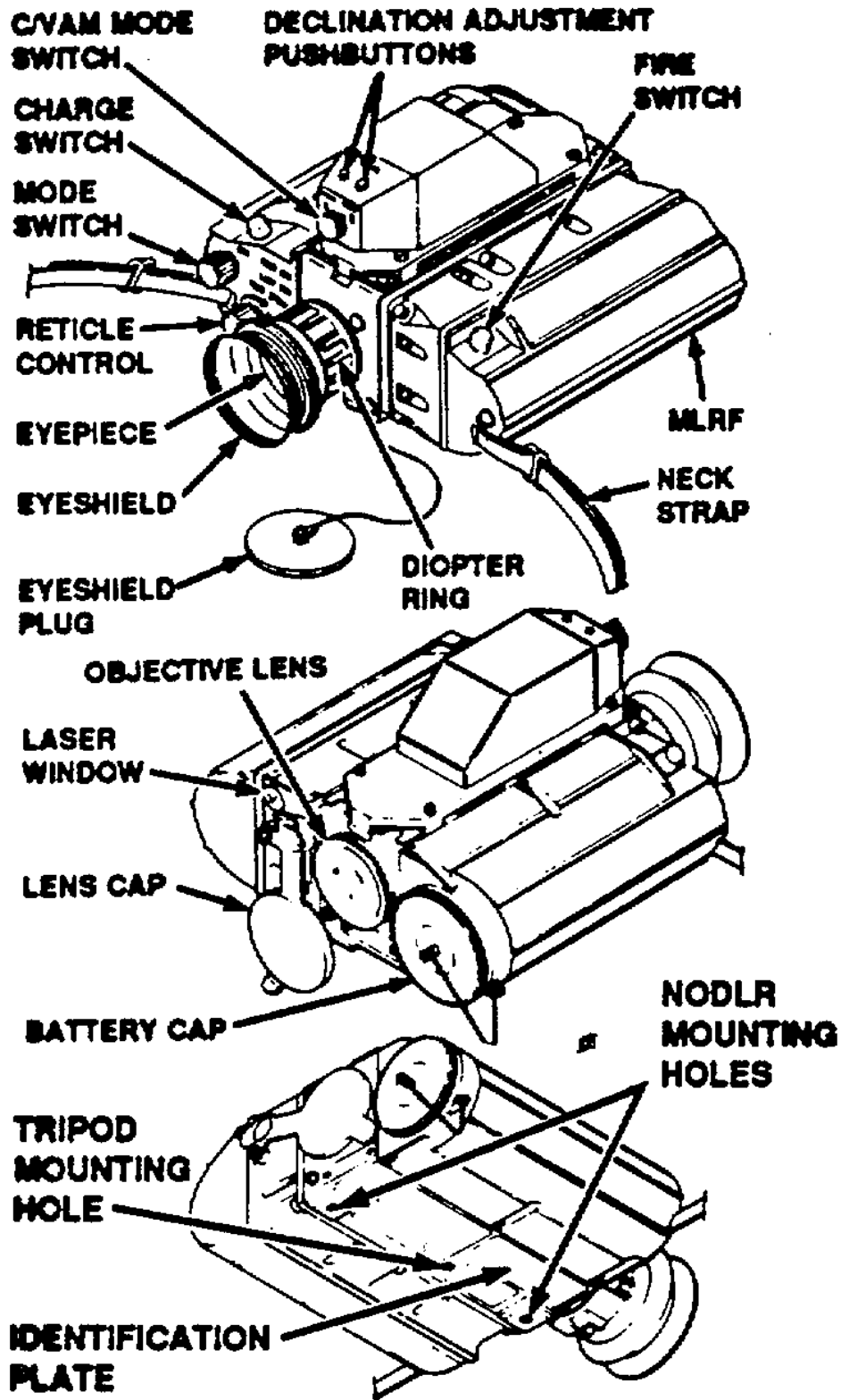


Figure 1-2. MELIOS Laser Rangefinder

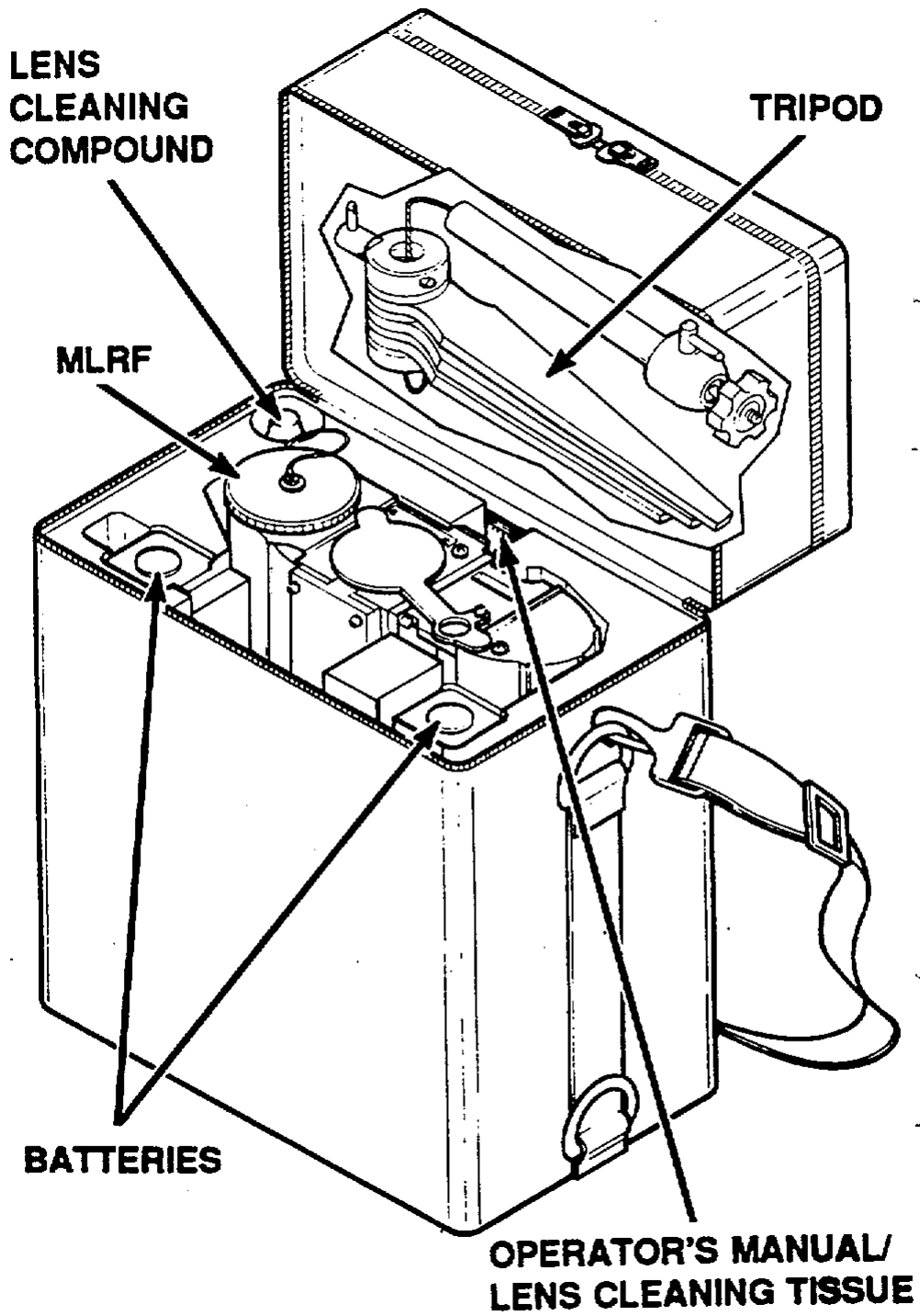


Figure 1-3. Carrying Case and Components

## Chapter 2 Operating Instructions

### Section I. Controls and Indicators

#### 2-1. Description and Use of Operator's Controls and Indicators (Figure 2-1).

- a. MLRF Mode Switch (Figure 2-2).

The MLRF Mode Switch has 4 settings:

- |              |   |
|--------------|---|
| (1)Off       | Power is not applied to the MLRF.   |
| (2)FIRST RTN | Power is applied and the first return signal from the target determines the range to be displayed. When multiple targets are ranged, the range to the closest target is displayed. The Multiple Target Indicator is illuminated if more than one return signal is received. |

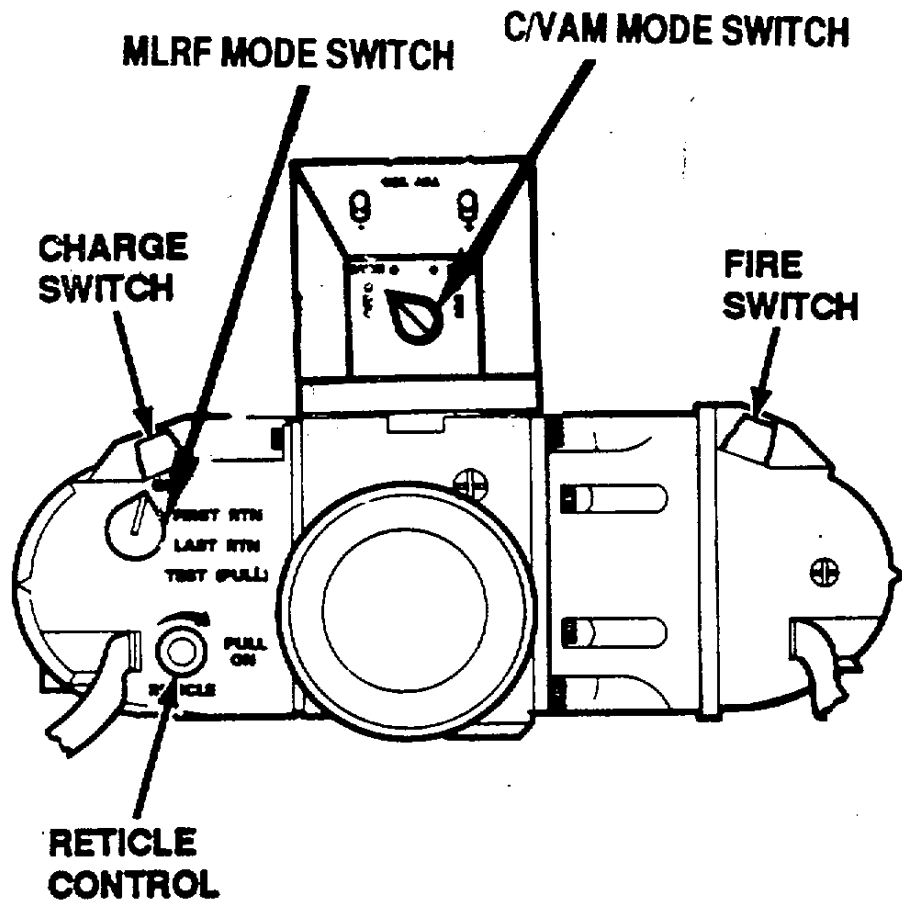


Figure 2-1. MELIOS Controls and Indicators

- (3) LAST RTN      Power is applied and the last return signal from multiple targets is selected to determine range. The range to the farthest target is displayed. The Multiple Target Indicator will illuminate if more than one target.
  
- (4) TEST      To set the switch to the TEST position, pull switch out and turn. Pressing the Charge Switch will cause the range display to light all the LED elements and indicators (elements will display as four "8's").

## MLRF MODE SWITCH

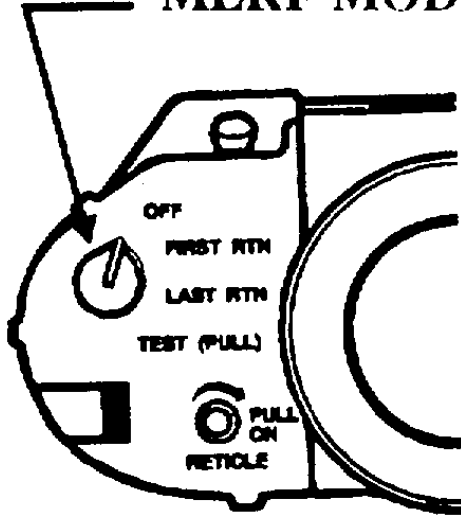


Figure 2-2. MLRF Mode Switch

## b. Charge Switch (Figure 2-3).

The Charge Switch applies power to the charging circuit. When charging is completed, the Ready Indicator displays in the eyepiece indicating the laser is ready to fire. The unit will shut down if the Fire Switch is not pressed within eight seconds after the Charge Switch is pressed. Pressing the Charge Switch while in the TEST position will display four "8's" in the range display, the C/VAM will show 4 dashes, the ready and multiple target indicators will illuminate.

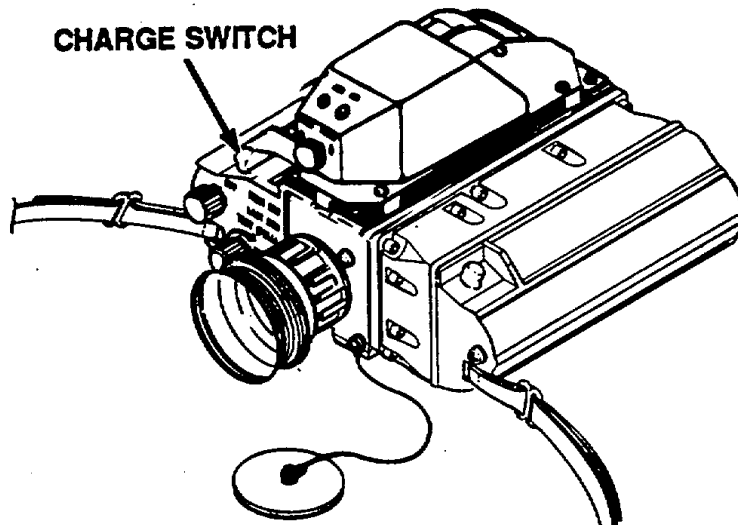


Figure 2-3. Charge Switch

## c. Fire Switch (Figure 2-4).

When the Fire Switch is pressed, the laser fires and starts the timing circuit. Timing stops when a return signal is received (either the first return signal or the last return signal). The timing value is converted to a range in meters. The range value is displayed in the eyepiece. The value is displayed until the Fire Switch is released. The display will go out five seconds after the Fire Switch is released and the unit will shut down, if no return is received the display will remain 0000.

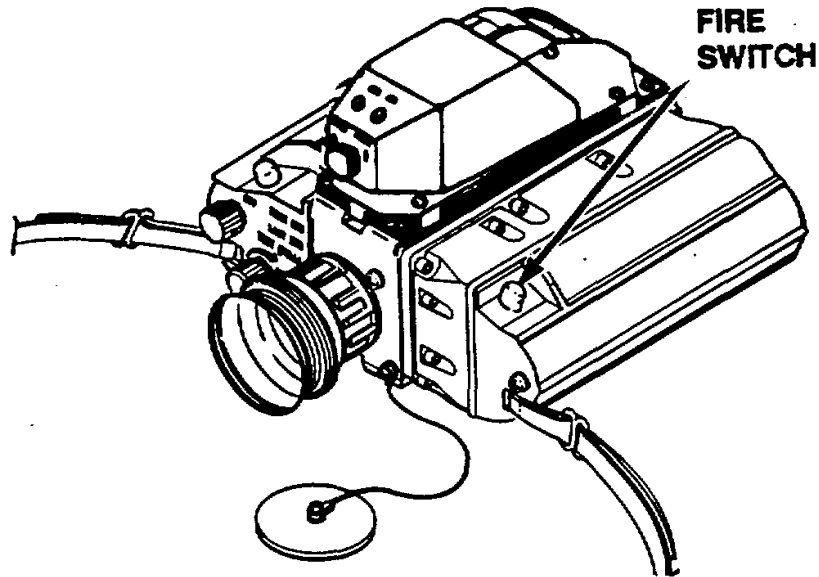


Figure 2-4. Fire Switch



## d. Reticle Control (Figure 2-5).

The RETICLE control is used to light up the aiming circle and aiming lines in the eyepiece display. After pressing the Charge Switch, pulling the RETICLE control out and rotating the control clockwise will brighten the reticle, rotating the control counterclockwise will dim the reticle. Pressing the control turns the reticle off. Reticle illumination is not provided when the Mode Switch is in the OFF position. Reticle will go out after 8 seconds but will be reactivated when Charge Switch is pressed.

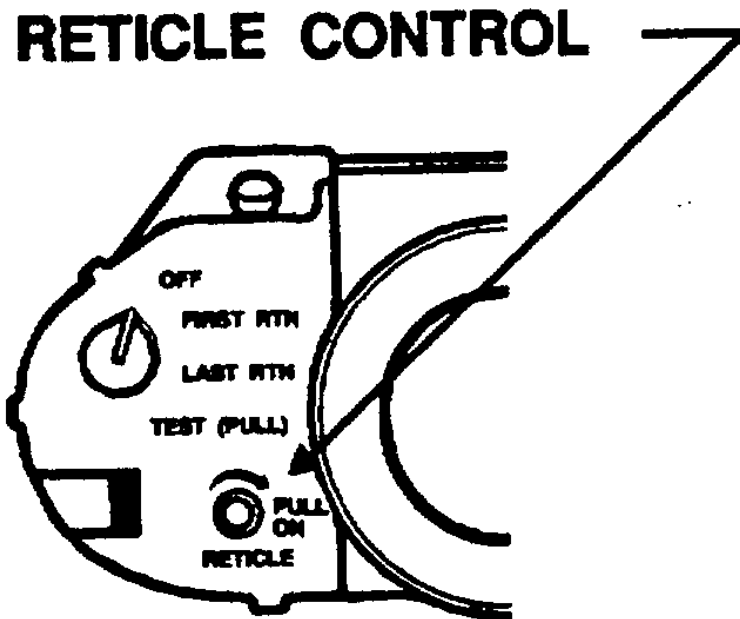


Figure 2-5. Reticle Control

e. Diopter Adjustment (Figure 2-6).

The diopter ring around the eyepiece permits the operator to bring the target into clear focus.

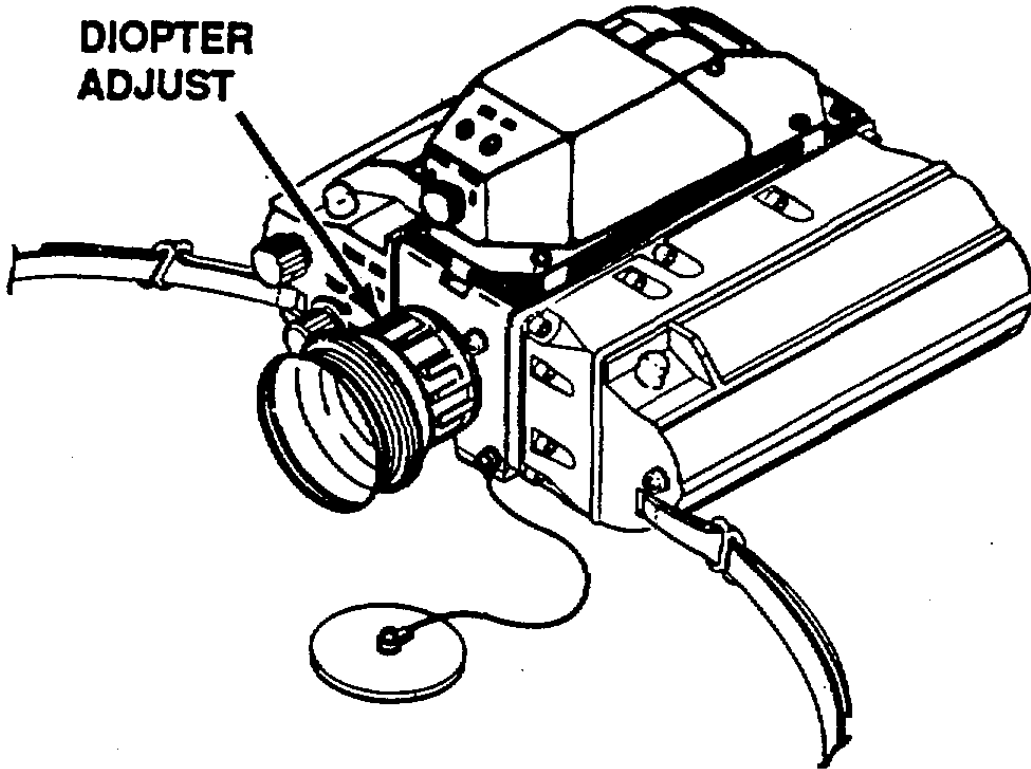


Figure 2-6. Diopter Ring

f. Eyepiece Display (Figure 2-7).

The following items of information are seen while looking at a target through the MLRF:

(1) Range Display.

The range is displayed at the bottom of the field- of-view of the eyepiece. The four digits indicate the range in meters with the last digit displaying a zero or a five.

(2) Ready Indicator.

The Ready Indicator is a red LED to the left of the digits in the Range Display.

(3) Multiple Targets Indicator.

The Multiple Target Indicator is a red LED to the right of the digits in the Range Display.

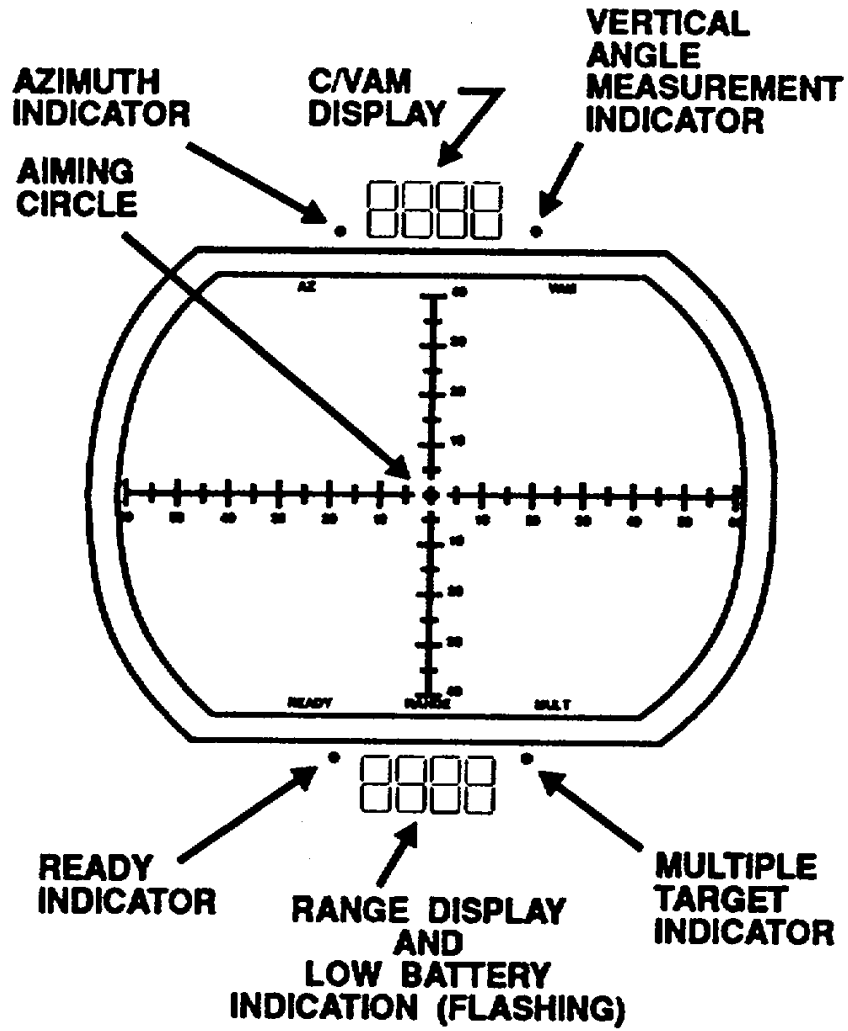


Figure 2-7. Eyepiece Display

(4) C/VAM Display.

Azimuth or vertical angle measurements are displayed at the top of the field of view of the eyepiece display. The digits alternately indicate the azimuth in mils or degrees or vertical angle measurement in mils or degrees.

(5) AZ Indicator.

The azimuth indicator is a red LED to the left of the digits in the C/VAM display and illuminates when the azimuth is displayed.

(6) VAM Indicator.

The vertical angle measurement indicator is a red LED to the right of the digits in the C/VAM display and illuminates when vertical angle is displayed.

**NOTE**

**Operation of the C/VAM is equivalent to that of a magnetic compass therefore procedures that apply to a magnetic compass also apply to C/VAM.**

g. C/VAM Mode Switch. (Figure 2-8).

The Mode switch has 4 settings:

- (1) OFF            Power is not applied to the C/VAM.
- (2) C/VAM        Power is applied and C/VAM is in the standby mode. In this mode the C/VAM alternately displays, target azimuth and vertical angle information in upper eyepiece display when Fire Switch is pressed.

- ZERO Power is applied and C/VAM is ready for zeroing procedure to increase compass accuracy.
- DEC. Power is applied and C/VAM is ready for setting correct magnetic declination angle and C/VAM display for mils or degrees,
- h DEC. ADJ. +/- Pushbutton Switch(Figure2-8).
- (1)+ Increments declination display in single positive steps when pressed for less than 1 second.
- (2)- Increments declination display in single negative steps when pressed for less than 1 second.

**NOTE**

Pressing either of declination adjustment pushbuttons for more than 1 second causes the display to enter fast advance mode.

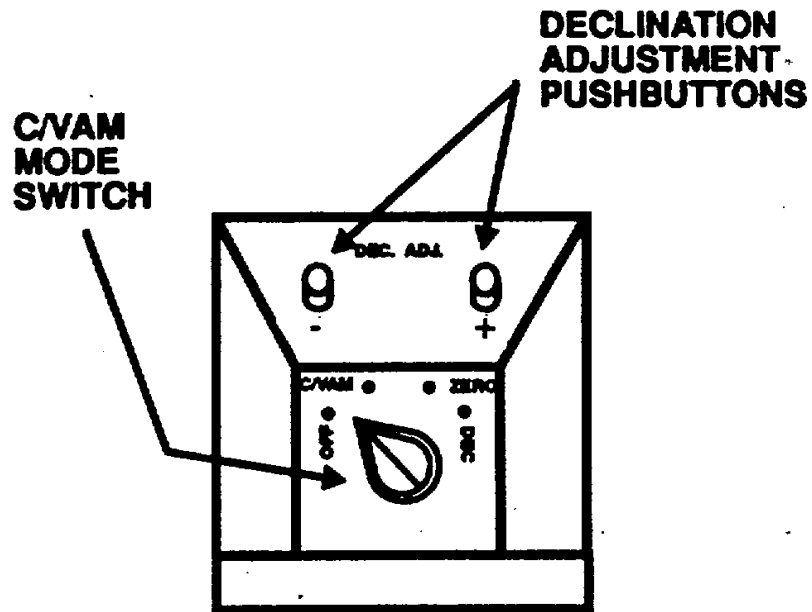


Figure 2-8. C/VAM Mode Switch



## i. Reticle.

The reticle has an aiming circle in the center of the aiming lines. The horizontal and vertical center aiming lines are marked at five mil increments. The value is marked at each ten mil increments. The reticle can be illuminated by pulling out and rotating the RETICLE control to the desired brightness.

## j. Low Battery Indication.

A Low Battery is indicated by blinking zeros in the range display with the MLRF Mode Switch in the FIRST RTN/LAST RTN positions after the Charge Switch is pressed. Blinking "8's" will be observed when the Mode Switch is in the TEST position after the Charge Switch is pressed. The blinking will continue until the Fire Switch is pressed or the unit shuts down. The Low Battery indication is intended to alert the operator that the battery is nearing a voltage that will not permit operation of the MLRF. When the battery voltage is too low to permit the MLRF to operate, the display and indicators will not light..

**NOTE**

**The number of ranges that may be performed with the Low Battery indication depends on various conditions. At some point the battery voltage will become too low to light the display and indicators.**

**Section II.**  
**Preventive Maintenance Checks and Services**

2-2. Preventive Maintenance Checks and Services

B - Before operation, D -During operation, A-  
After operation.

- (1) **Before Operation.** Always keep in mind the CAUTIONS and WARNINGS. Perform before (B) PMCS.
- (2) **During Operation.** Always keep in mind the CAUTIONS and WARNINGS. Perform during (D) PMCS.
- (3) **After Operation.** Always keep in mind the CAUTIONS and WARNINGS. Perform after (A) PMCS.
- (4) **If your equipment fails to operate.** Troubleshoot with the proper equipment. Report any deficiencies

using the proper forms.

The Preventive Maintenance Checks and Services table lists the inspections and care of your equipment required to keep it in good operating condition.

The Interval column of your PMCS table tells you when to do the checks and services. The Procedure column tells you how to do the required checks and services. Carefully follow these instructions. If the equipment does not perform as required, refer to Chapter 3 under troubleshooting for possible problems. Report any malfunctions on the proper forms. The Equipment Is Not Ready/Available If column tells you when and why your equipment cannot be used.

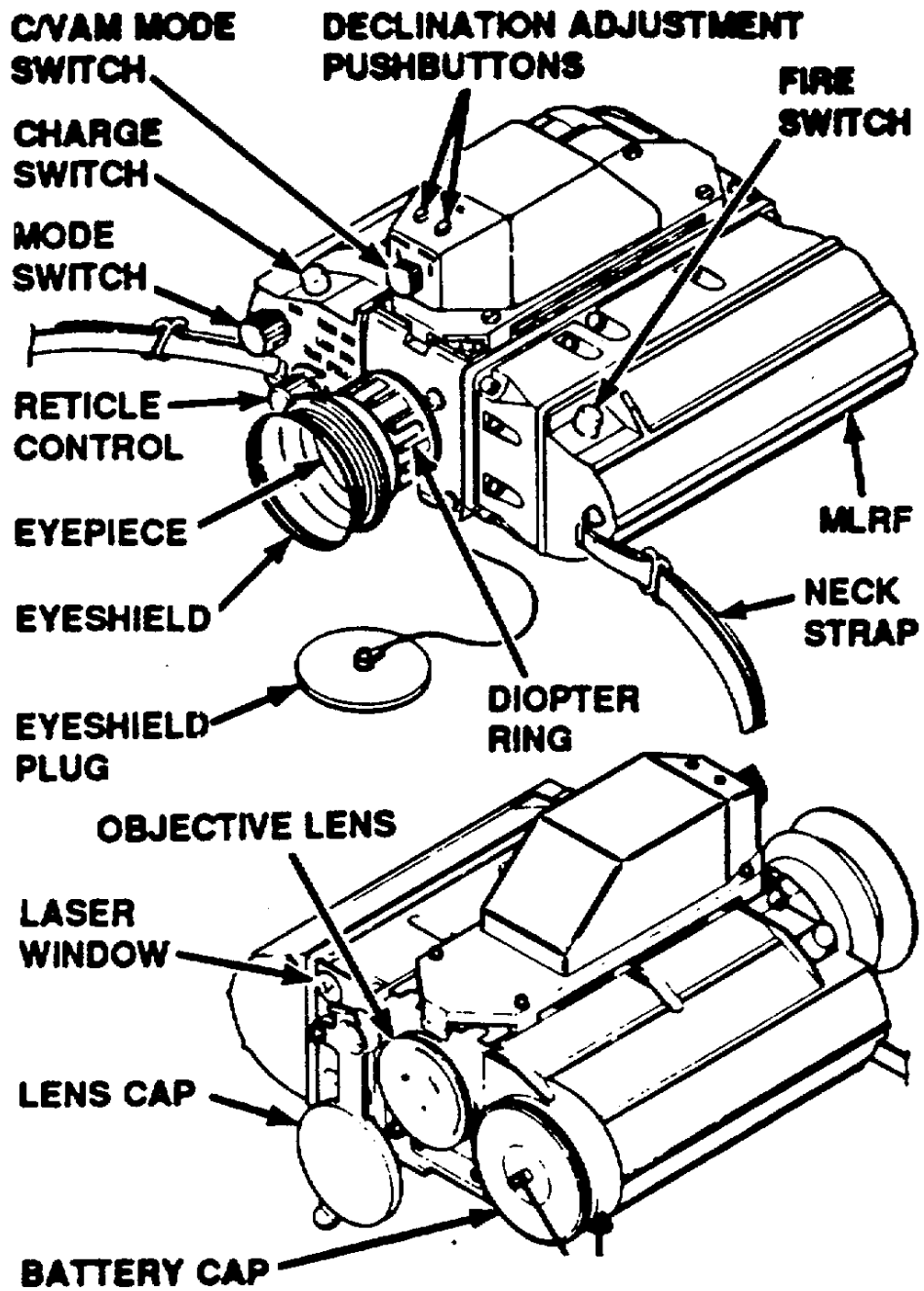


Figure 2-9. PMCS

ITEM NO.	INTERVAL			Item to be inspected	Procedure	Equipment is not ready/available if:
	B	D	A			
1	*		*	Carrying Case	Inspect case for damage and serviceability. Inspect shoulder strap for serviceability. Check for cleanliness.	
2	*		*	AN/PVS-6	Inventory components and inspect for cleanliness. Wipe dust and dirt from all components with a dry cloth	
3	*			MLRF	Inspect the objective lens, laser window, and eyepiece lens for dirt, cracks, and scratches circle. Use the lens cleaning compound and tissue to clean the lenses (para 3-1b).	The lenses are cracked.  Scratch obscures the aiming

ITEM NO.	INTERVAL			Item to be inspected	Procedure	Equipment is not ready/available if:
	B	D	A			
4	*			MLRF	Inspect housing, Mode Switch knob, Reticle Control Knob dioter ring rotation (approx. 180° rotation) for damage and serviceability.	Damaged or unserviceable.
5	*			MLRF	Inspect lens cap, eyeshield assembly, neck strap, lanyard on eyepiece plug for damage and	BtteryBB-516/U not charged within thirty days.
6	*		*	MLRF	Remove BB-516(U battery, check battery charge date. Inspect lanyard on-battery cap and battery compartment for warping, corrosion, dirt and debris. Clean dirt and debris from compartment Insect battery cap o-ring for damage.	

ITEM NO.	INTERVAL			Item to be inspected	Procedure	Equipment is not ready/available if:
	B	D	A			
7	*			C/VAM	Inspect housing Mode Switch knob, Declination Adjustment Pushbuttons and C/VAM housing for damage and unserviceability.	The display does not show all elements and indicators. No Ready Indicator No Range Value No AZ Value/Indicator No VAM Value/Indicator
8	*		*	MLRF	Perform operational test of MLRF (para. 2-3b).	



**Section III.**  
**Operation Under Usual Conditions**

**2-3. Operation Under Usual Conditions.**

**WARNING**  
Lithium Battery  
BA-6516/U

Battery BA-6516/U, contains a gas under pressure. Do NOT heat, puncture, disassemble, short circuit or attempt to recharge, or otherwise tamper with battery. Turn off equipment if battery compartment becomes hot. Wait until battery has cooled before removing it. Lithium Batteries have safety vents to prevent explosion. When they are venting gas, you will smell gas, your eyes may become irritated, or you may hear the sound of gas escaping. When safety vents have operated, batteries must still be handled with care. Return batteries to Defense Reutilization and Marketing Office for disposal in accordance with DOD Handbook 4160. 21-M.

**WARNING**  
**Nickel Cadmium Battery**  
**BB-516/U**

**Battery BB-516/U should be handled in the following manner: 1) Do NOT dispose of in fire. 2) Do NOT short circuit. 3) Return batteries to Defense Reutilization and Marketing Office for disposal in accordance with DOD Handbook 4160. 21-M.**

**CAUTION**

**Metal objects and electrical sources can affect the performance of a C/VAM. Nonmagnetic metals and alloys do not affect C/VAM readings. The following are suggested as minimum safe distances to ensure C/VAM proper functioning:**

- High-tension power lines: 55 meters
- Field gun, truck, or tank: 10 meters
- Telegraph or telephone wires and barbed wire: 10 meters
- Machine gun: 2 meters
- Rifle: 1/2 meter

**NOTE**

**Sight and Range at least three times to the target. This will increase the confidence that you have targeted the proper point and the range value is accurate, and use the tripod to provide a stable support for the MLRF while ranging at targets of 1200 meters or greater.**

- a. Prepare for Operation.
- Open the carrying case
  - Remove the MLRF from the carrying case
  - Ensure Mode Switches are in OFF position
  - Insert known good battery (para. 3-1c)
  - Rotate front lens cap away from the objective lens and laser window (Figure 2-10)
  - Pull eyeshield plug out of eyeshield
  - Adjust diopter setting for clear focus
  - Zero the C/VAM if the MLRF has been relocated more than 100 miles from the last location it was zeroed and whenever a battery has been removed or replaced. (para 2-3e).

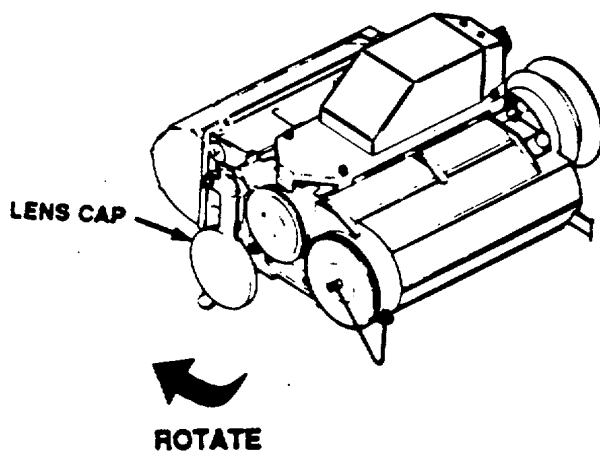


Figure 2-10. Lens Cap

**NOTE**

**When ranging with the MLRF, marksmanship procedures should be used.**

b. Operational Test.

Follow the operational test of the MELIOS and refer to the troubleshooting chart (para 3-2) step indicated if symptom of malfunction occurs.

- Prepare for operation (para. 2-3a)
- Place neck strap around neck
- Pull and turn MLRF Mode Switch to TEST position
- Press and release Charge Switch
- Observe display through eyepiece lens for all elements and indicators to be lit (Step 1, para. 3-2) If display blinks with MLRF Mode Switch in any switch position after Charge Switch is pressed (Step 4, para. 3-2) (If display goes out, press and release Charge Switch)
- Press and release Fire Switch (Laser will fire)
- Pull and turn MLRF Mode Switch to FIRST RTN or LAST RTN (Figure 2-2)
- Press and release Charge Switch
- Observe display If there is no Ready Indicator three seconds after Charge Switch is pressed (Step 5, para. 3-2)

- View through eyepiece and place aiming circle on a target at a distance of 50 meters or greater
- Press and hold Fire Switch after Ready Indicator lights. If there is no range value displayed one second after Fire Switch is pressed (Step 6, para. 3-2)
- Press Charge Switch then pull out RETICLE control and rotate to desired brightness

**NOTE**

**If area is brightly lit, the reticle illumination may be difficult to see. Press lens cap over objective lens and laser window.**

If Reticle does not illuminate (Step 2, para. 3-2) If you cannot see target clearly (Step 3, , para. 3-2)

- Set the C/VAM mode switch to "C/VAM" to place the C/VAM in the standby mode

- Press the MLRF Charge Switch and observe the upper C/VAM standby display (four “dashes”)
- If a banking display appears, reposition the MLRF to a more level position (Figure 2-11)
- The display will go out after 10 seconds. Press the Charge Switch again to reactivate the charge switch
- If “FAIL” appears in the display, refer to Chapter 3 Maintenance Instructions
- Press the MLRF Fire Switch and observe the upper C/VAM display for alternating AZ and VAM indications. The display will alternately display the target azimuth and elevation angles in mils or degrees for 2.5 seconds two times each
- Press the Fire Switch again within 10 seconds to repeat the same indications or press and hold the Fire Switch for a continuous repeating display

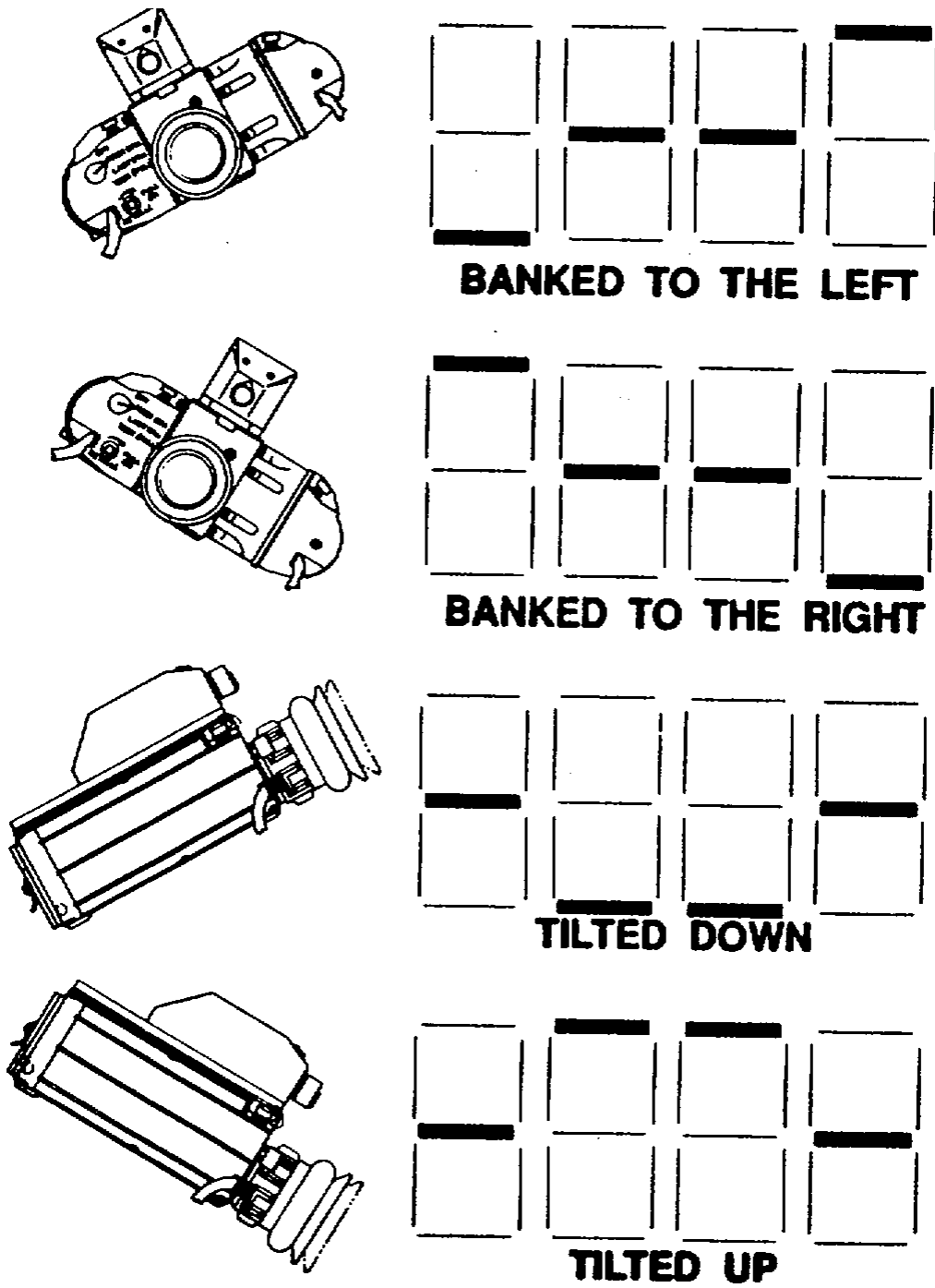


Figure 2-11. Banking Display



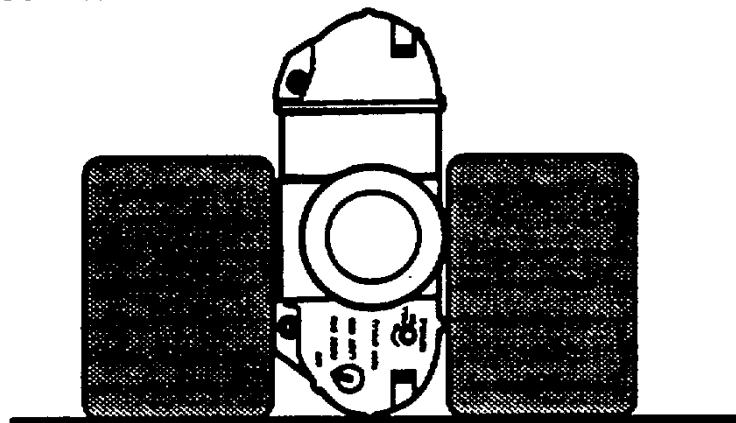
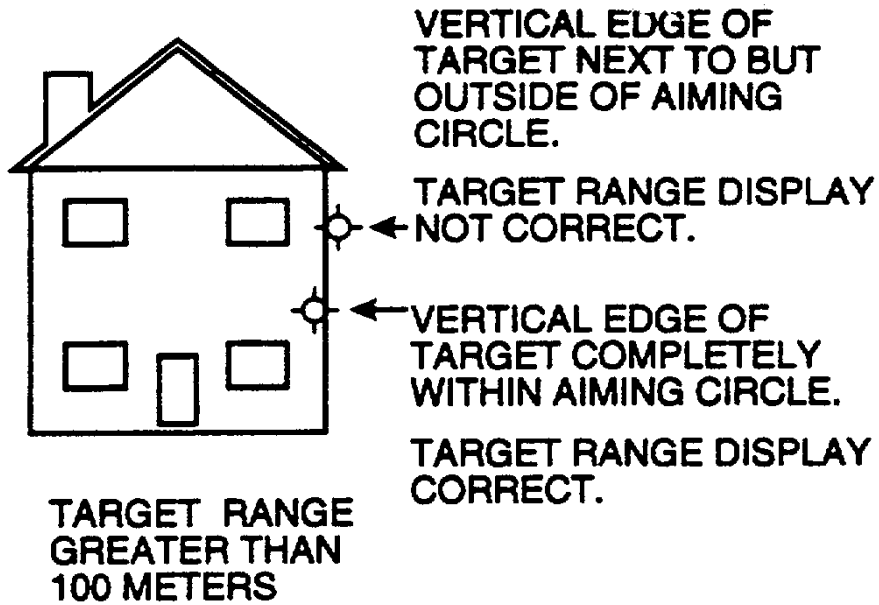
- Press the Charge Switch to begin a new measurement cycle
- Perform boresight verification (para. 2-3c)
- Perform C/VAM declination adjustment (para. 2-3d) if required
- Perform C/VAM zeroing (para 2-3e) if required
- Follow shutdown procedure (para. 2-3h)

c. Boresight Verification

Perform the following procedure to ensure that the MLRF reticle aiming circle and laser beam are within boresight limits and whenever there is a doubt as to the accuracy of a range reading.

- Attach MLRF to tripod (para 2-3g)
- Select a target with distinct vertical edges (telephone pole, building, etc. ) at a range greater than 100 meters.
- Position the MLRF until the left or right vertical edge of the target is just touching but outside of the aiming circle (Figure 2-12). No portion of the target should be within the aiming circle.

- " Observe that the range display does not indicate the correct range.
- " Reposition the MLRF until the vertical edge of the target is within the aiming circle (Figure 2-12).
- " Measure target range and observe that the range display indicates the correct range to the target.
- " Failure to observe the change in range display indicates the MLRF is not within boresight limits. Turn MLRF in to Unit Maintenance.
- " Repeat the above procedure using a horizontal edge of the target. If no horizontal edge is available, remove MLRF from tripod, rotate MLRF 90° (support on stable surface) and repeat above procedure using a vertical edge.
- " Failure to observe the change in range display indicates the MLRF is not within boresight limits. Turn MLRF in to Unit Maintenance.



WHEN NO HORIZONTAL EDGE OF TARGET IS AVAILABLE, REMOVE MLRF FROM TRIPOD, ROTATE 90° AND SUPPORT ON STABLE SURFACE TO OBSERVE VERTICAL EDGE.

Figure 2-12. Boresight Verification

## d. C/VAM Declination Adjustment Mode (DEC. ).

The C/VAM declination mode lets you enter the correct magnetic declination angle for your particular location. If you have not been provided with a declination angle for your specific location, do not perform this procedure.

- Place C/VAM Mode Switch in DEC. position.
- Press MLRF Charge Switch and observe the declination angle displayed in mils or degrees. The display will remain for 20 seconds.

**NOTE**

**Determine the desired display, in mils or degrees. If current display is acceptable skip next step unless you want to reset the declination display to zero.**

- Press MLRF Fire Switch to toggle display between mils and degrees and set declination angle to zero.
- 

**NOTE**

**Pressing and holding a + or - DEC. ADJ. Pushbutton longer than one second activates the repeat mode for a faster change of the declination angle indication.**

- Press + or - DEC. ADJ. Pushbutton to increment display until required declination angle is displayed.
  - Press MLRF Charge Switch within 20 seconds of last activation of the + or - DEC. pushbutton to store new declination angle and display mode.
- e. C/VAM Zeroing Procedure.

Zeroing the C/VAM results in the most accurate compass indication. The earth's magnetic field is generally stable over distances less than 100 miles. The MLRF magnetic field is affected by battery replacement and is stabilized by repeated firings of the laser.

Zeroing is accomplished by firing the laser twelve times with the MLRF in three different positions at each of the four main compass azimuth positions as shown in Figure 2-13. The compass azimuth positions are not critical and may be within  $\pm 20^\circ$  ( $\pm 355$  mils) of the C/VAM azimuth display indication. The three different positions at each azimuth position are selected from the following:

- MLRF level
- MLRF tilted up and banked (Figures 2-11 and 2-13)
- MLRF tilted down and banked.

**NOTE**

A banking display will (Figure 2-11) occur if the amount of "up or down" (tilt) approximately 30° and "left or right" (bank) positioning is approximately 300. If a "banking" display occurs, reposition the MLRF before making measurement. Each time the laser is fired and a successful measurement is made the C/VAM display will indicate the count of the last firing from "01" to "11". An unsuccessful measurement will result in an error (ER) display of the last firing from "ER01" to "ER12". An unsuccessful measurement must be repeated until all twelve measurements are successful. The internal compensation factor is computed automatically after making the twelfth successful measurement.

- Turn MLRF Mode Switch to FIRST RTN
- Press Charge Switch
- Observe READY indicator lights
- Press Fire Switch

- Continue to press Charge and Fire Switches until laser is fired three times
- Turn C/VAM Mode Switch to ZERO
- Press Charge Switch

**NOTE**

**If "-04-" display lights, press the fire switch to toggle display to "-12-"**

- Observe READY indicator and C/VAM standby display (four "dashes") lights
- Point MLRF North (f 200) in level position
- Press Fire Switch

**CAUTION**

**Hold MLRF as steady as possible until C/VAM display lights. Excessive or sudden movements can cause inaccuracies/error message to be displayed,**

- Observe C/VAM display
- If "ERO1" is displayed, repeat measurement at same azimuth position

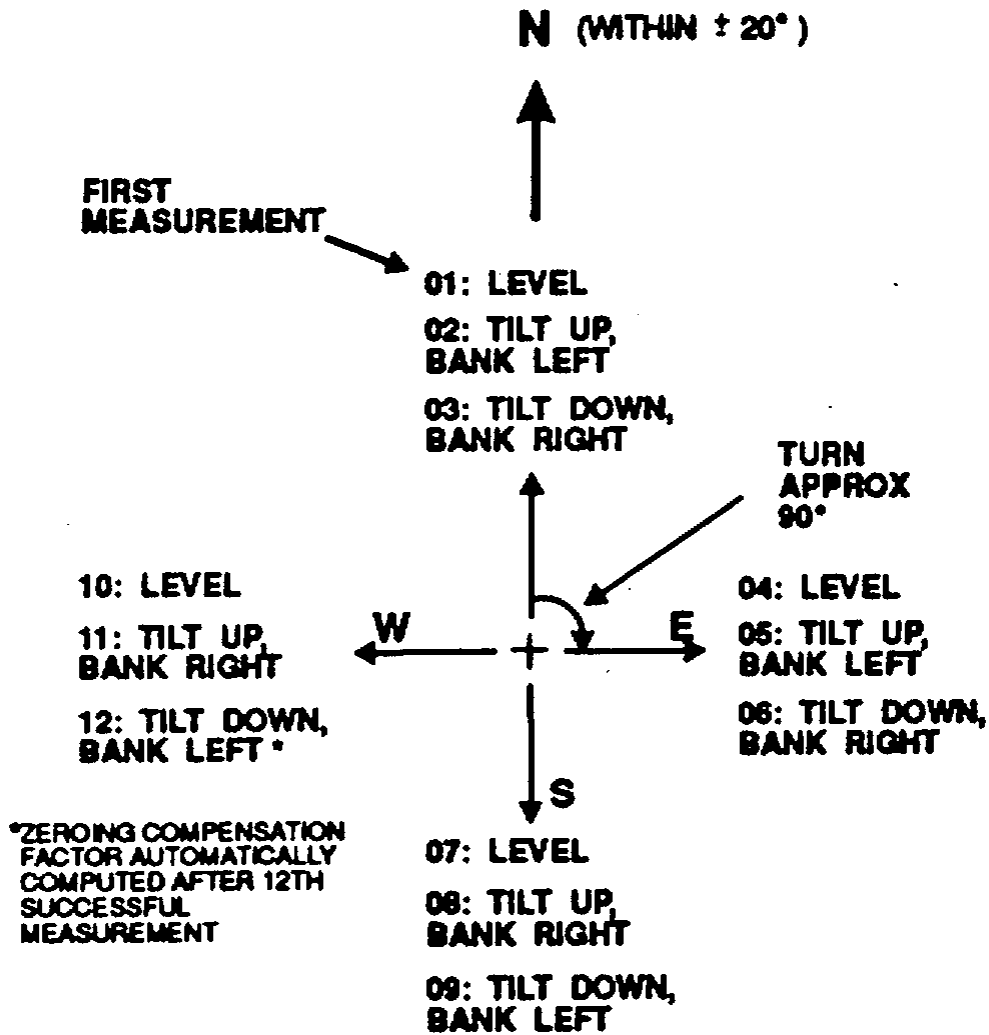


- If "01" is displayed, proceed to the next measurement at the same azimuth position
- Press Charge Switch
- Observe READY indicator and C/VAM standby display (four "dashes") lights
- Tilt MLRF UP about 300 and bank it to the left about 300
- If "banking" display occurs (Figure 2-11), reposition MLRF until standby display returns
- Press Fire Switch
- Observe C/VAM display
- If "ERO2" is displayed repeat measurement
- If "02" is displayed, proceed to next measurement at same azimuth position
- Press Charge Switch
- Observe READY indicator and C/VAM standby display lights
- Tilt MLRF down about 300 and bank it to the right about 300
- Press Fire Switch
- Observe C/VAM display
- If "ER03" is displayed, repeat measurement
- If "03" is displayed proceed to next measurement

**NOTE**

Repeat laser firings for each of the remaining MLRF positions as shown in Figure 2-13 and noted below:

MEAS NO.	AZ POS ( $\pm 20^\circ$ )	TILT	BANKING
04	EAST (900)	LEVEL	LEVEL
05	EAST (900)	UP	LEFT
06	EAST (900)	DOWN	RIGHT
07	SOUTH (1800)	LEVEL	LEVEL
08	SOUTH (1800)	UP	RIGHT
09	SOUTH (180°)	DOWN	LEFT
10	WEST (270°)	LEVEL	LEVEL
11	WEST (2700)	UP	RIGHT
12	WEST (2700)	DOWN	LEFT



**PRESS CHARGE SWITCH THEN FIRE SWITCH FOR EACH MEASUREMENT**

*Figure 2-13. Zeroing Measurements*

- Observe C/VAM display, dashes move back and forth across display after twelfth successful measurement.
- Display continues flashing dashes for up to five minutes while compensation constant is calculated.
- Observe blank display to indicate calculation is complete
- Press Charge Switch.
- Observe C/VAM display indicates "q!" (good) - Accuracy better than 10 mils  
"Ac15". . . "AC95" - Accuracy f15. 95 mils  
repeat zeroing procedure  
"Ac—" - Calculation procedure failed, repeat zeroing procedure  
"FAIL" - C/VAM malfunction, return to unit maintenance
- If displayed accuracy is acceptable, move C/VAM mode switch to C/VAM position

#### NOTE

**If "AC15" to "AC—" is displayed, improved C/VAM accuracy can be achieved by holding the charge switch down until the "ACXX" DISPLAY GOES OUT and the "-12-" display appears. Then repeat the zeroing procedure. When this is**

done the C/VAM adds the second set of measurements to the first to increase accuracy.

If it is suspected that the compensation constant has been corrupted (e. g. C/VAM near vehicle or power line), perform the following to enter the default zero compensation constant:

- Maintain C/VAM Mode Switch in ZERO position
- Press and hold the Charge Switch (five seconds or more)
- Observe C/VAM display indicates ("res?")
- Release Charge Switch briefly and once again press and hold for five seconds
- Observe C/VAM display, dashes move back and forth across display
- Release Charge Switch
- Observe C/VAM display blanks after five to ten seconds to indicate default compensation constant has been entered

**NOTE**

**The zeroing procedure must be performed after clearing the compensation constant.**

#### Four Shot Compensation Procedure

The 4 shot procedure is geometrically much simpler than the 12 shot and no banking is required. This procedure may be needed to update C/VAM compensation after a short move.

#### NOTE

**Never move before the measurement is complete (i. e. before the C/VAM display lights again). Tilt at least 300 (lift the MELIOS up until the warning -- is shown, then go down until it disappears).**

- Turn C/VAM mode switch to ZERO
- Press charge switch
- Observe Ready indicator C/VAM standby display "-04-" lights

- Position MLRF as shown below and make measurements

**MEASUREMENT POSITIONS**

	AZ POS (+/-45°)	ANGLE	TILT
1.	Approx North	+200 to +300	UP
2.	Approx East	-200 to -30°	DOWN
3.	Approx South	+200 to +300	UP
4.	Approx West	-200 to -300	DOWN

- Observe successful measurement indicator (“01” thru “04” after each measurement)
- After last measurement, observe moving dashes
- After display goes out, press charge switch
- Observe display (qgud, Acl5, ect)
- If accuracy displayed is acceptable, move C/VAM mode switch to C/VAM
- If accuracy displayed is not acceptable, repeat 4 shot compensation procedure

## f. Handheld Ranging Operation.

- Prepare for operation (para. 2-3a)
- Open carrying case
- Remove MLRF from carrying case
- Place strap around neck
- Remove eyeshield plug from eyeshield
- Rotate front lens cap away from objective lens and laser window

If target is clearly visible (Figure 2-14).

- Turn MLRF Mode Switch to FIRST RTN

If target is partially hidden (for instance, among trees, smoke, dust, etc. ):

- Turn MLRF Mode Switch to LAST RTN
- Set the C/VAM mode switch to C/VAM to place in standby mode
- Look through eyepiece, place reticle aiming circle on target
- Press and release Charge Switch



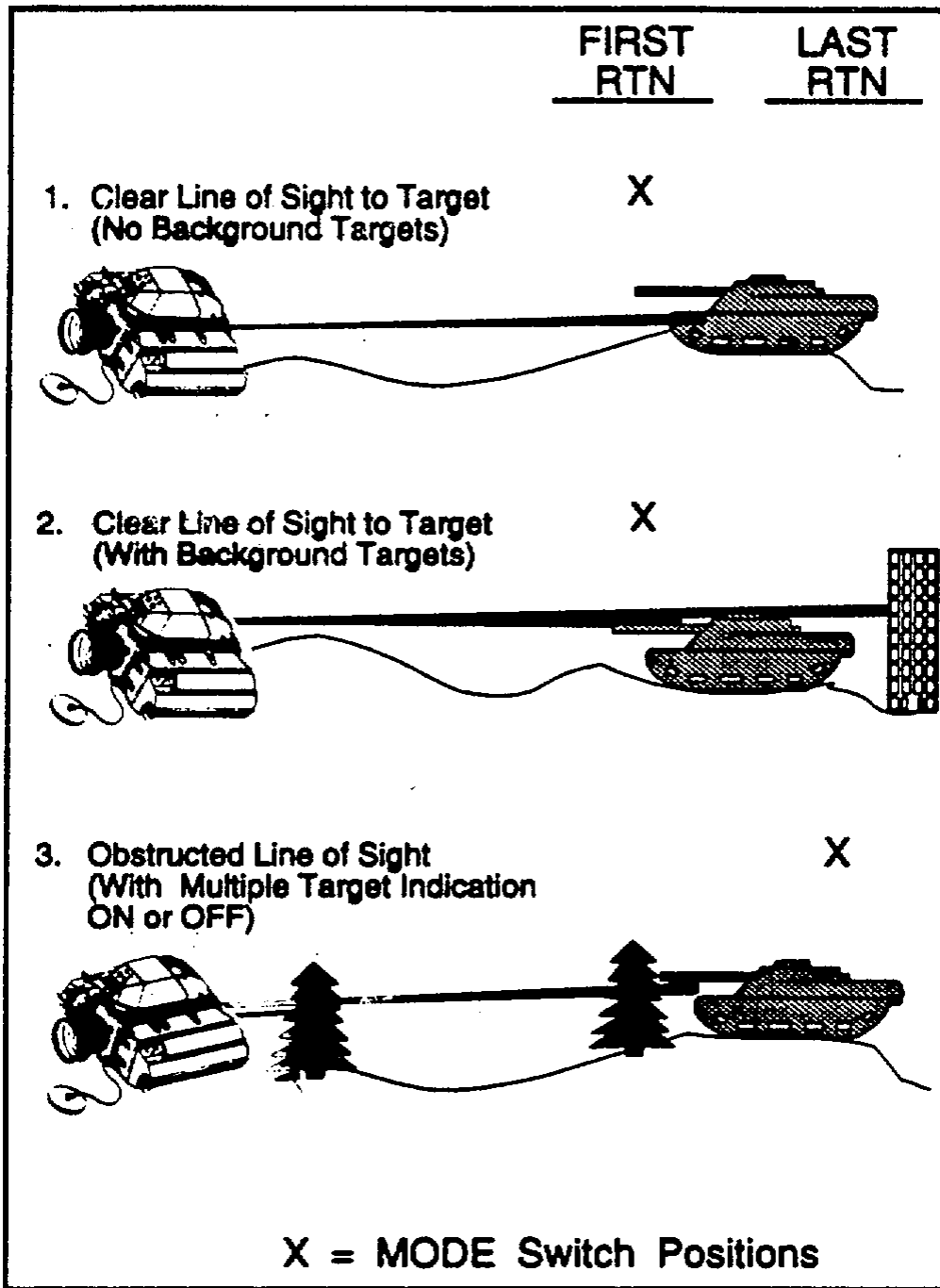


Figure 2-15. Mode Switch Positions

- Observe the C/VAM standby display (four “dashes”)

**NOTE**

**If you do not range a target in eight seconds after the Charge Switch is pressed, the MLRF will shut down and you will have to press the Charge Switch again. Position the MLRF to center the reticle on target using good marksmanship techniques**

- If a banking display appears, reposition the MLRF to a more level position (Figure 2-11)
- The display will go out after 10 seconds. Press the Charge Switch to repeat the display until the standby display appears
- If a “FAIL” indication appears in the display, refer to Chapter 3 Maintenance Instructions

When Ready Indicator lights (Figure 2-15).

- Hold aiming circle steady on target
- Press and hold Fire Switch
- Read "Range" at bottom of display
- Release Fire Switch
- Observe upper C/VAM display for alternating AZ and VAM indications. The display will alternately display target azimuth and elevation angles in mils or degrees for 2.5 seconds two times each
- Press and hold Fire Switch again to repeat the same indications or press and hold Fire Switch for a continuous repeating display
- Press Charge Switch to begin a new measurement cycle
- If ranging operations are complete, follow shutdown procedure (para 2-3h)

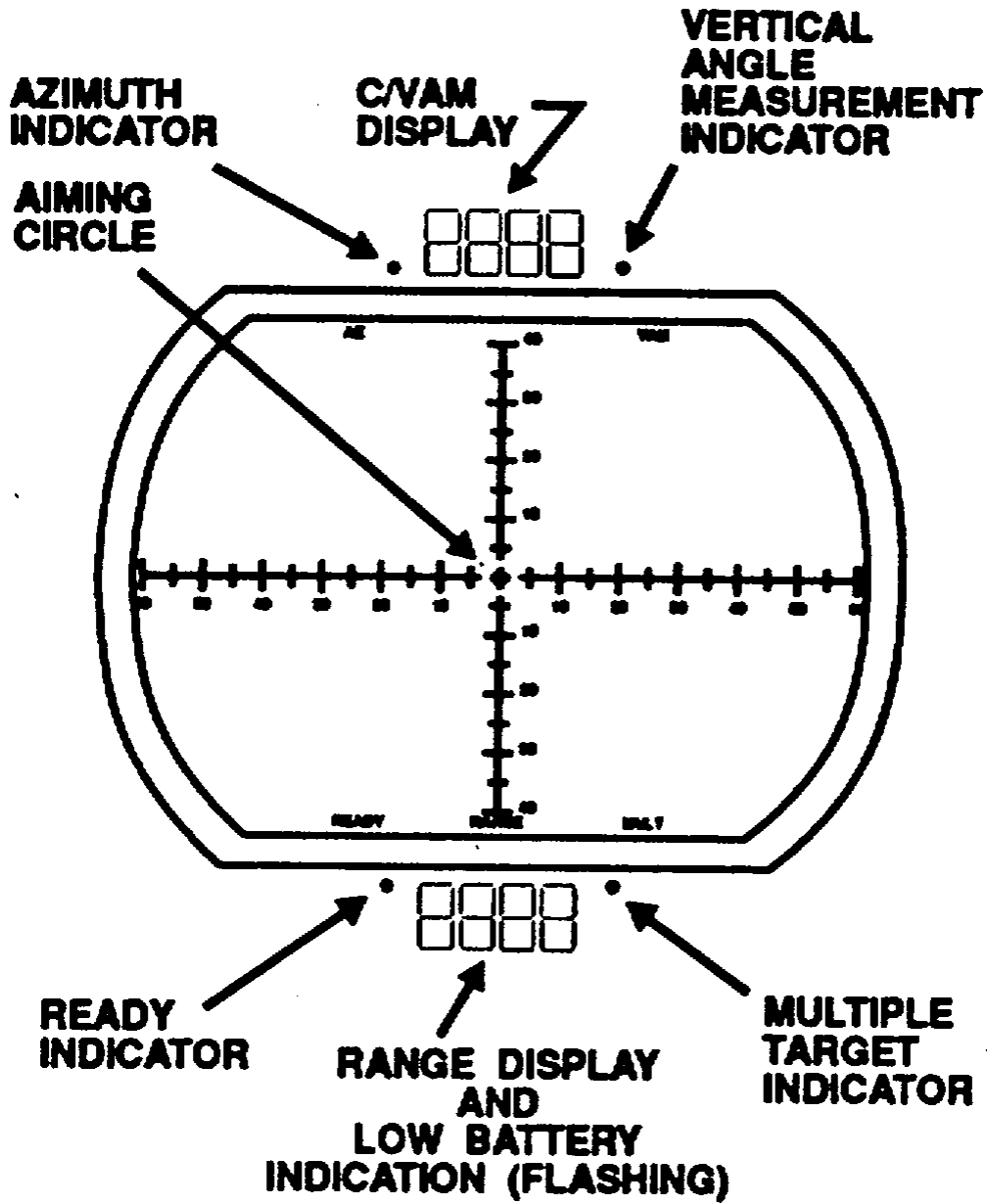


Figure 2-15. Ready Indicator

## e. Tripod-mounted Ranging Operation.

- Prepare for operation (para 2-3a)
- Open carrying case
- Remove tripod

**NOTE**

**Ensure both tripod height and azimuth elevation adjustment locks are loosened.**

- Invert MLRF and place on flat surface with tripod mounting hole facing up (Figure 2-16)
- Insert tripod shaft and lanyard through leg mount and tighten height adjustment lock by turning clockwise
- Mount tripod on MLRF by aligning the mounting screw over mounting hole
- Tighten mounting screw until tripod is securely attached to MLRF
- Tighten azimuth/elevation lock by turning clockwise
- Open tripod legs and invert MLRF on stable surface

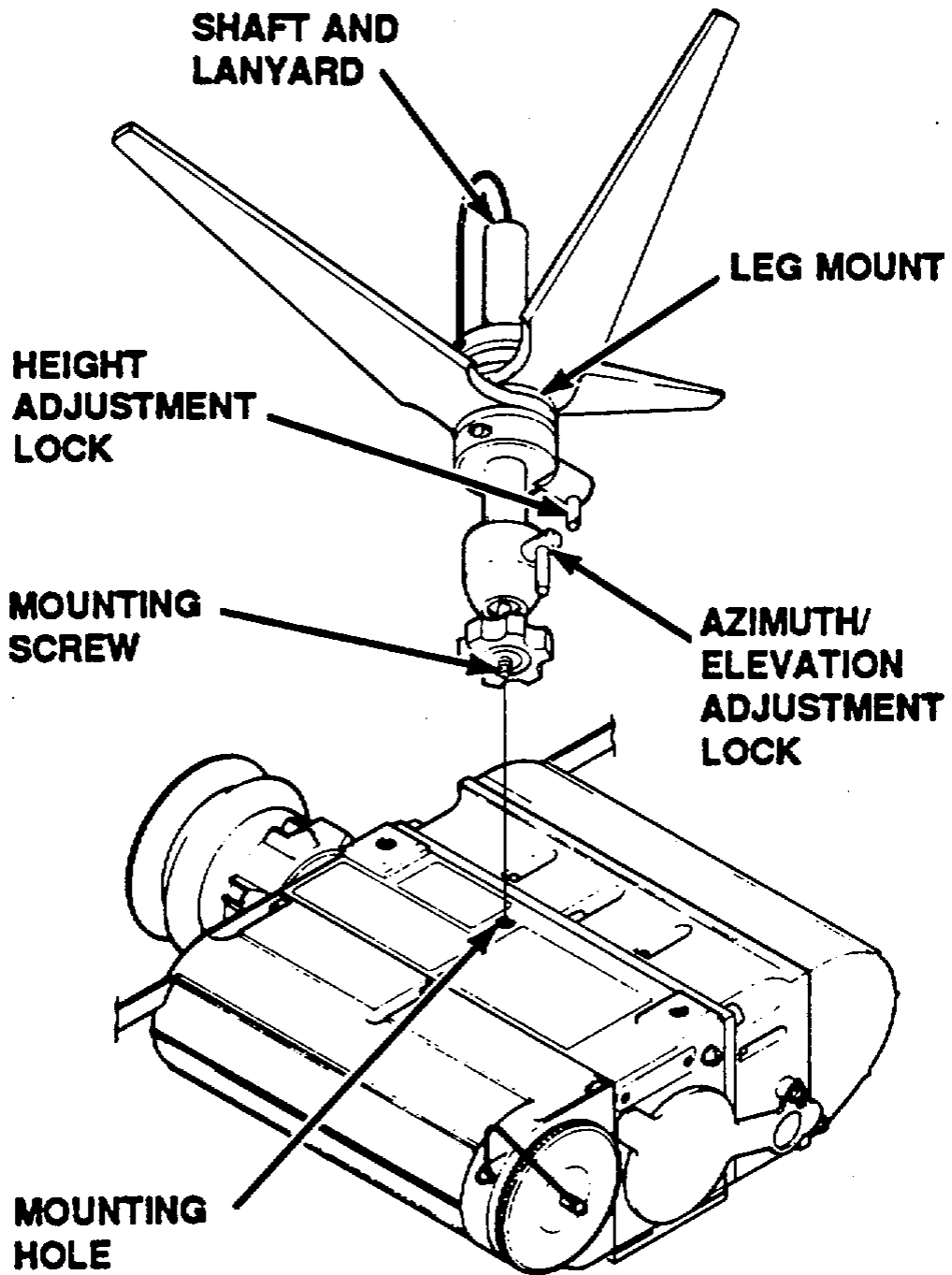


Figure 2-16. Tripod Mounting

- Remove eyeshield plug from eyeshield
- Rotate front lens cap away from objective lens and laser window

h. Shutdown Procedure.

When finished operating the MELIOS:

- Turn MLRF Mode Switch OFF
- Press Reticle control in
- Turn C/VAM mode switch OFF
- Rotate lens cap over objective lens and laser window
- Place eyeshield plug in eyeshield
- Remove MLRF from tripod or from around neck
- Release tripod height adjustment lock and withdraw shaft and lanyard from leg mount Figure 2-16
- Remove battery
- Return all equipment to the carrying case
- Close carrying case

**Section IV.**  
**Operation Under Unusual Conditions**

**2-4. Operation Under Unusual Conditions.**

Operating the MELIOS during adverse weather or battlefield conditions may adversely impact ranging distance, but should not affect C/VAM accuracy as long as the target is visible in the field of view. Adverse conditions are defined as smoke, dust, fog, heavy rain, snow, and degraded visibility.

The BA-6516/U is the preferred battery for extreme low temperature operation.

Hardness - Do not use DS-2 for decontaminating the MELIOS. To decontaminate, use a 5% sodium hypochlorite, rinse by wiping with a hot (1580F) soapy water, dry and wipe metal parts with oil.



## Chapter 3 Maintenance Instructions

### Section I. Operator Maintenance

#### 3-1. Operator Maintenance.

Operator Maintenance is limited to cleaning, replacing the battery, replacing the shoulder strap for the carrying case, and replacing the neck strap. There are no lubrication requirements for the AN/PVS-6 MELIOS.

##### a. MELIOS Components Cleaning Instructions.

- Remove components from carrying case
- Wipe dust and dirt from all components with a dry cloth
- Wipe dust and dirt from the carrying case with a dry cloth
- Return all components to the carrying case

b. Lens Cleaning Instructions.

- Rotate lens cap away from objective lens and laser window. Remove eyeshield plug from eyeshield
- Using a dry lens cleaning tissue brush off all loose dirt from the eyepiece lens, laser window, and objective lens
- Dampen a folded lens cleaning tissue (item 2, App C) with lens cleaning compound (item 1, App C). Lightly and slowly wipe the lens. After one stroke, discard tissue. Repeat this procedure until the glass surface is clean.
- Rotate lens cap and press over objective lens and laser window. Replace eyeshield plug in eyeshield.

**WARNING**  
**Lithium Battery**  
**BA-6516/U**

**Battery BA-6516/U, contains a gas under pressure. Do NOT heat, puncture, disassemble, short circuit or attempt to recharge, or otherwise tamper with battery. Turn off equipment if battery compartment becomes hot. Wait until battery has cooled before removing it. Lithium Batteries have safety vents to prevent explosion. When they are venting gas, you will smell gas, your eyes may become irritated, or you may hear the sound of gas escaping. When safety vents have operated, batteries must still be handled with care. Return batteries to Defense Reutilization and Marketing Office for disposal in accordance with DOD Handbook 4160. 21-M.**

**WARNING**  
**Nickel Cadmium Battery**  
**BB-516/U**

**Battery BB-516/U should be handled in the following manner: 1) Do NOT dispose of in fire. 2) Do NOT short circuit. 3) Return batteries to Defense Reutilization and Marketing Office for disposal in accordance with DOD Handbook 4160. 21-M.**

c. Replacement of Battery (Figure 3-1).

- Ensure the Mode Switch is in the OFF position
- (1) Remove:
- Unscrew battery cap counterclockwise and remove cap
  - Remove battery
  - Replace battery cap turning the cap clockwise

(2) Install:

- Unscrew battery cap counterclockwise and remove cap.
- Insert battery, positive contact first.
- Replace battery cap by turning the cap clockwise.

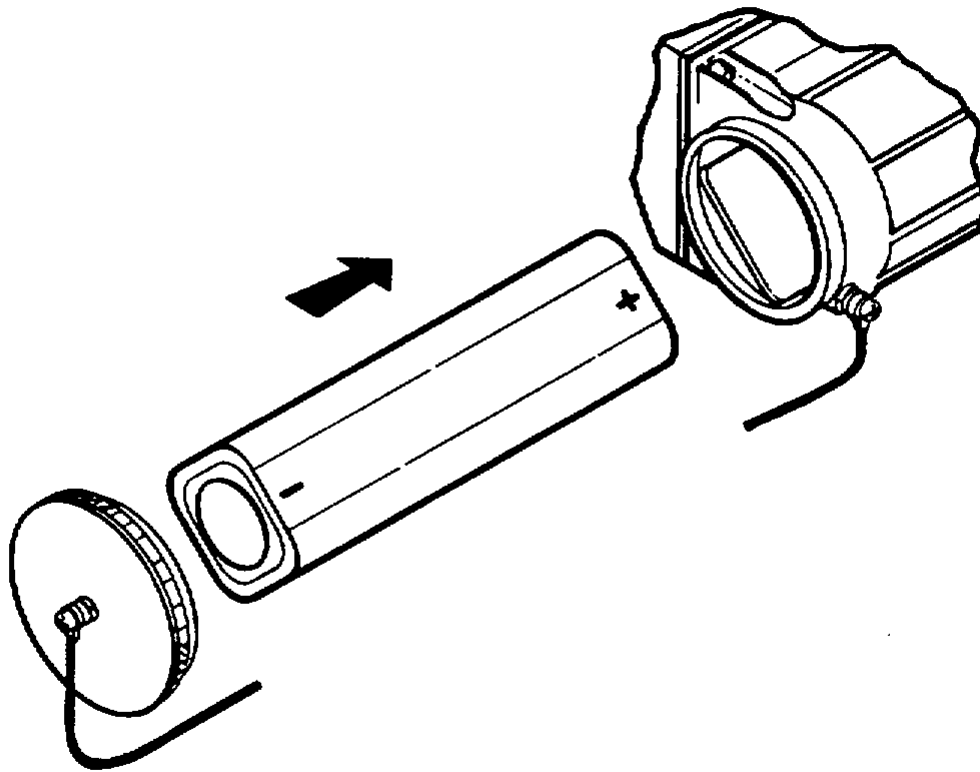


Figure 3-1. Battery Replacement

## d. Replacement of Neck Strap (Figure 3-2).

(1) Remove. Slide the ends of the strap through the buckles. Pull the strap from around the pin of the MLRF.

(2) Install. Slide the ends of the replacement strap around the pins, from the eyepiece side, on the MLRF and weave the ends through the buckles. Adjust to desired length. Insert short end of strap back through buckle to prevent slippage.

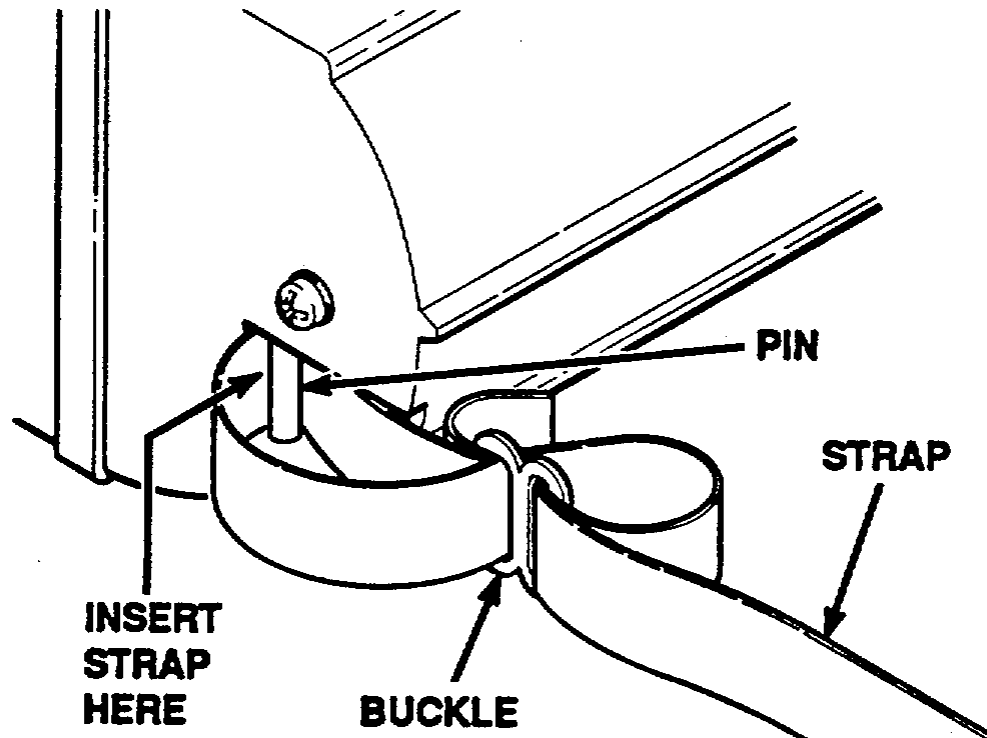


Figure 3-2. Neck Strap Replacement

**3-2. Troubleshooting.**

The Troubleshooting Chart lists some of the troubles that you may find while operating the MELIOS. You should perform the tests, inspections, and corrective actions in the order listed.



---

<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

---

**NOTE**

**THE FOLLOWING MALFUNCTIONS APPLY TO BOTH THE  
RANGEFINDER AND C/VAM FUNCTIONS.**

1. RANGE (FOUR "8's") AND CNAM STANDBY (FOUR "DASHES") DISPLAYS AND INDICATORS DO NOT LIGHT OR IF ONLY SOME ELEMENTS LIGHT. ENSURE MODE SWITCH IS IN TEST. PRESS CHARGE SWITCH.  
TURN IN TO UNIT MAINTENANCE.
2. NO RETICLE ILLUMINATION.

**NOTE**

**IF AREA IS BRIGHTLY LIT, THE RETICLE MAY BE DIFFICULT TO SEE, PRESS LENS CAP OVER OBJECTIVE LENS AND LASER WINDOW.**

PULL OUT RETICLE CONTROL, TURN FULL CLOCK-  
WISE.

TURN IN TO UNIT MAINTENANCE.

---

<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

---

3. CANNOT SEE TARGET CLEARLY.  
 CHECK FRONT LENS CAP, ROTATE LENS CAP  
 AWAY FROM OBJECTIVE LENS, ADJUST EYEPIECE  
 DIOPTRER RING, CHECK EYEPIECE AND  
 OBJECTIVE LENS FOR DIRT, CLEAN LENSES.  
 TURN IN TO UNIT MAINTENANCE.

**NOTE****THE FOLLOWING MALFUNCTIONS APPLY TO ONLY THE RANGEFINDER FUNCTION.**

4. DISPLAY BLINKS WITH MODE SWITCH IN TEST/FIRST  
 RTN/LAST RTN AFTER CHARGE SWITCH IS PRESSED.  
 LOW BATTERY INDICATION.  
 REPLACE BATTERY.

IF DISPLAY CONTINUES TO BLINK WITH A KNOWN  
 GOOD BATTERY INSTALLED.  
 TURN IN TO UNIT MAINTENANCE.

5. NO READY INDICATOR THREE SEC. AFTER CHARGE  
 SWITCH PRESSED.  
 ENSURE SWITCH IS IN FIRST RTN OR LAST RTN,  
 PRESS CHARGE SWITCH AGAIN.  
 TURN IN TO UNIT MAINTENANCE.
6. NO RANGE DISPLAYED ONE SEC. AFTER FIRE SWITCH  
 PRESSED.  
 ENSURE MODE SWITCH IN FIRST RTN OR LAST  
 RTN, PRESS CHARGE SWITCH. WAIT THREE SEC. ,  
 SIGHT ON TARGET, PRESS FIRE SWITCH.  
 TURN IN TO UNIT MAINTENANCE.

---

<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
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**NOTE****THE FOLLOWING MALFUNCTIONS APPLY TO ONLY THE CNAM FUNCTION.**

7. NO AZIMUTH OR VERTICAL ANGLE INFORMATION DISPLAYED WHEN FIRE SWITCH IS PRESSED.  
ENSURE CNAM MODE SWITCH IS IN CNAM POSITION.  
TURN IN TO UNIT MAINTENANCE.
8. FAIL INDICATION IN CNAM DISPLAY.  
REPEAT OPERATION THAT CAUSED FAIL INDICATION.  
IF FAIL INDICATION REPEATS, TURN IN TO UNIT MAINTENANCE.
9. DECLINATION ADJUSTS MODE DOES NOT OPERATE.  
ENSURE C/VAM MODE SWITCH IS IN DEC. POSITION.  
TURN IN TO UNIT MAINTENANCE.

---

<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

---

10. ZERO FUNCTION DOES NOT OPERATE.  
ENSURE CNAM MODE SWITCH IS IN ZERO POSITION.  
TURN IN TO UNIT MAINTENANCE.
  
11. AZIMUTH DISPLAY ERROR.  
CHECK DECLINATION THEN PERFORM ZEROING PROCEDURE AND REPEAT COMPASS MEASUREMENT.  
TURN IN TO UNIT MAINTENANCE.

## Appendix A REFERENCES

### A-1. Scope.

This appendix lists all forms and technical manuals referenced in this manual.

DA Pam 25-30	Consolidated Index of Army Publications and Blank Forms
DA Pam 738-750	The Army Maintenance Management System (CAMMS)
DOD Handbook	Defense Demilitarization Manual 4160. 21-M
FM 3-5	NBC Decontamination
TM 11-5855-253-10	Operator's Manual Night Observation Device, Long Range AN/UAS-11
TM 750-244-2	Procedure for Destruction of Material to Prevent Enemy use
TM 11-6130-392-12	Operator and Organizational Maintenance Manual Battery Charger, PP-7286/U

**Appendix B  
COMPONENTS OF END ITEM  
AND  
BASIC ISSUE ITEMS**

**Section I. Introduction**

**B-1. Scope.**

This appendix lists components of end item and basic issue items for the Mini Eyesafe Laser Infrared Observation Set (MELIOS) AN/PVS-6 to help you inventory items required for safe and efficient operation.

**B-2. General.**

The Components Of End Items and Basic Issue Items lists are divided in the following sections:

a. Section II Components Of End Item. This listing is for informational purposes only and is not authority to requisition replacements. These items are part of the end item. As part of the end item, these items must be with the end item

whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

- b. Section III Basic Issue Items. There are no Basic Issue Items associated with this system.

**B-3. Explanation of Columns**

The following provides an explanation of columns found in tabular listings:

- a. Illus Number. The number used to identify item called out in the illustration.
- b. National Stock Number. Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.
- c. Description. Indicates the Federal Item Name and, if required, minimum description to identify and locate the item. The last line of each item indicates the CAGE (in parenthesis) followed by the manufacturer's primary part number.

d. Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g. , ea., in., pr. ).

e. Quantity Required. Indicates the quantity of the item authorized to be used with/on the equipment.



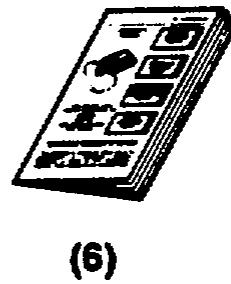
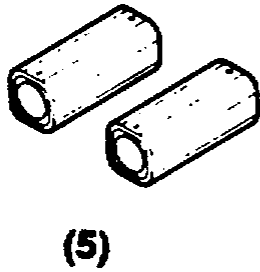
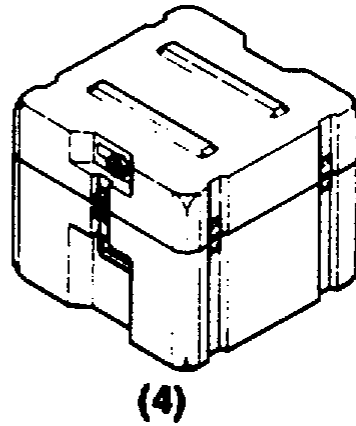
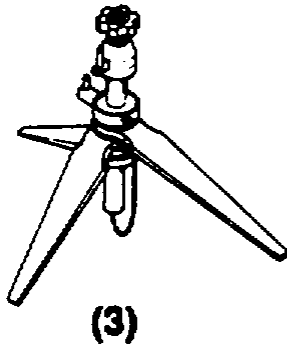
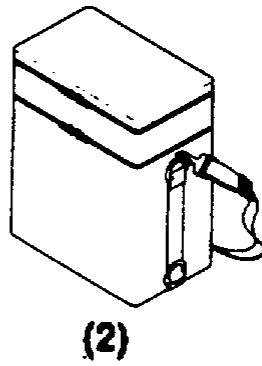
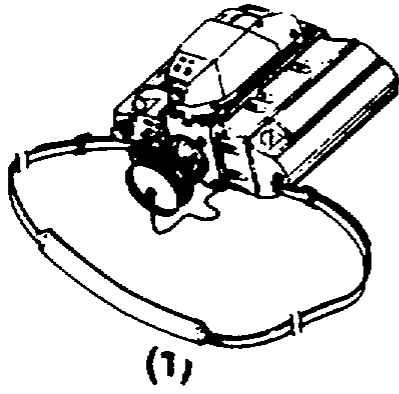


Figure B-1. Components of End Item

Section II. Components of End Items

(1) Illus Number	(2) NSN	(3) Description Part Number (CAGE)	(4) U/M	(5) Qty Rqr
1		MELIOS - Laser Rangefinder A3187120(80063)	EA	1
2		Case, Carrying A3187229 (80063)	EA	1
3	5860-01-326-0669	Tripod, Assembly A3187238 (80063)	EA	1
4		Case, ShippingEA1 A3187194 (80063)		
5	140-01-042-9942	Battery, Rechargeable, Sealed Nickel Cadmium	EA	2
6		Operator's Manual	EA	1

Section III. Basic Issue Item

(1) Illus Number	(2) NSN	(3) Description Part Number (CAGE)	(4) U/M	(5) Qty Rqr
		None		

**Appendix C**  
**EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST**

**Section I. Introduction**

C-1. Scope.

This appendix lists Expendable/Durable Supplies and Materials you will need to operate and maintain the Mini Eyesafe Laser Infrared Observation Set (MELIOS) AN/PVS-6. These items are authorized by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. Explanation of Columns.

a. Item Number. This number is a materials list assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g. "Use cleaning compound, Item 1, App. C").

**C-1**

- b. Level. This column identifies the lowest level of maintenance that requires the item.
- c. National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.
- d. Description. Indicates the Federal Item Name and, if required, minimum description to identify and locate the item. The last line of each item indicates the part number followed by the Commercial And Government Entity (CAGE) in parenthesis, if applicable.
- e. Unit of Measure (U/M). Indicates the measure used-in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea., in., pr.). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.
- f. Expendable/Durable (EX/DUR) Indicates whether the item is expendable or durable.

Section II. Expendable/Durable Supplies and Material List

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M	(6) EX/DUR
1	C	6850-01-076-9656	Cleaning Compound SM-B-852137	EA	EX
2	C	6640-00-393-2090	Paper, Lens SM-B-955651	EA	EX
3	C		Battery, Non-Rechargeable, Lithium BA-6516/U (80058)	EA	EX
4	C	6140-01-042-9942	Battery, Rechargeable, BB-516/U	EA	EX

C-3(C-4 blank)

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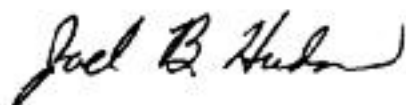
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By Order of the Secretary of the Army:

DENNIS J. REINER  
*General, United States Army*  
*Chief of Staff*

Official:



*Acting Administrative Assistant to the*  
*Secretary of the Army*  
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# THE METRIC SYSTEM AND EQUIVALENTS

## WEIGHT MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches  
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches  
 1 Kilometer = 1000 Meters = 0.621 Miles

## WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1000 Grams = 2.2 lb.  
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

## SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches  
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet  
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

## CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches  
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

## TEMPERATURE

$5/9(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212° Fahrenheit is equivalent to 100° Celsius  
 90° Fahrenheit is equivalent to 32.2° Celsius  
 32° Fahrenheit is equivalent to 0° Celsius  
 $9/5^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

## APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
its	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
ometers per Liter	Miles per Gallon	2.354
ometers per Hour	Miles per Hour	0.621



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