



WÄRTSILÄ

OPERATORS MANUAL

FOR

NIGHT DRIVING VIEWER AN/VVS-501

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CHAPTER 1

INTRODUCTION

1-1. PURPOSE AND SCOPE

This manual contains basic operating and maintenance instructions for Driver's Night Vision Viewer AN/VVS-501.

1-2. DESCRIPTION AND DATA

- a. The night viewer enables a closed-hatch vehicle to be driven under dark night and starlight conditions without active illumination and presents the viewer area as a green image display. It also permits observation from a closed-hatch vehicle under the same conditions.
- b. The night viewer can be installed within the vehicle by one person. Primary power is supplied by the vehicle power cable. Batteries can be used in the night viewer if vehicle power is not, or cannot be, connected to it. The batteries also enable off-vehicle operation, such as may be required for searching and observing operations.
- c. The table presented in Table 1-1 lists operational characteristics of the night viewer. For a more detailed description of individual components, refer to the Unit Maintenance Manual and Direct Support Maintenance Manual for Viewer, Night Driver's Night Vision AN/VVS-501.

Parameter	Range
Objective focus range	4 meters to infinity
Focus	Fixed
Field of View:	
- horizontal	45 degrees
- vertical	38 degrees
	800 mils (45 degrees)
Magnification	Unity
Portable operation time limit	12 hours, minimum (auxiliary battery life)
Weight	9.5 kilograms
Operational temperature range	-51°C to 52°C (-59°F to 125°F)
Storage temperature range	-51°C to 68°C (-59°F to 155°F)
Operating voltage	28V (vehicle) 2x1.5V Alkaline AA Battery (auxiliary)

Table 1-1. Table of Operational Characteristics

CHAPTER 2

PREPARATION FOR USE

2-1. GENERAL

This Part contains instructions and information necessary to prepare the night viewer for operation. Included are a discussion of operating controls and procedures for applying both vehicle and battery power.

CAUTION

Batteries must be removed before vehicle power is connected.
Batteries should not be discarded into fire, as they will explode.

2-2. DESCRIPTION OF OPERATING CONTROLS

- a. The only operating control is an OFF/BRIGHT switch control, which adjusts image brightness and also turns power off. Figure 2-1 shows the location of the rotary switch, the battery compartment, and the vehicle power receptacle.

CAUTION

The entrance window must never be aimed directly at the sun. Damage to the image intensifier tube will result even if the system is not powered.

The system can be used in the presence of headlights, flares, full moon, and other light sources, which might be found in tactical conditions without risk to the image

2-3 PREOPERATIONAL PROCEDURE—VEHICLE POWER

- a. To install the night viewer into the vehicle, proceed as follows:
- b. (1) If day vision periscope is mounted, remove periscope and stow it properly.
(2) Remove night viewer from vehicle stowage container and then remove head assembly protective cover (see Figure 2-1).
(3) Place protective cover in vehicle stowage container.

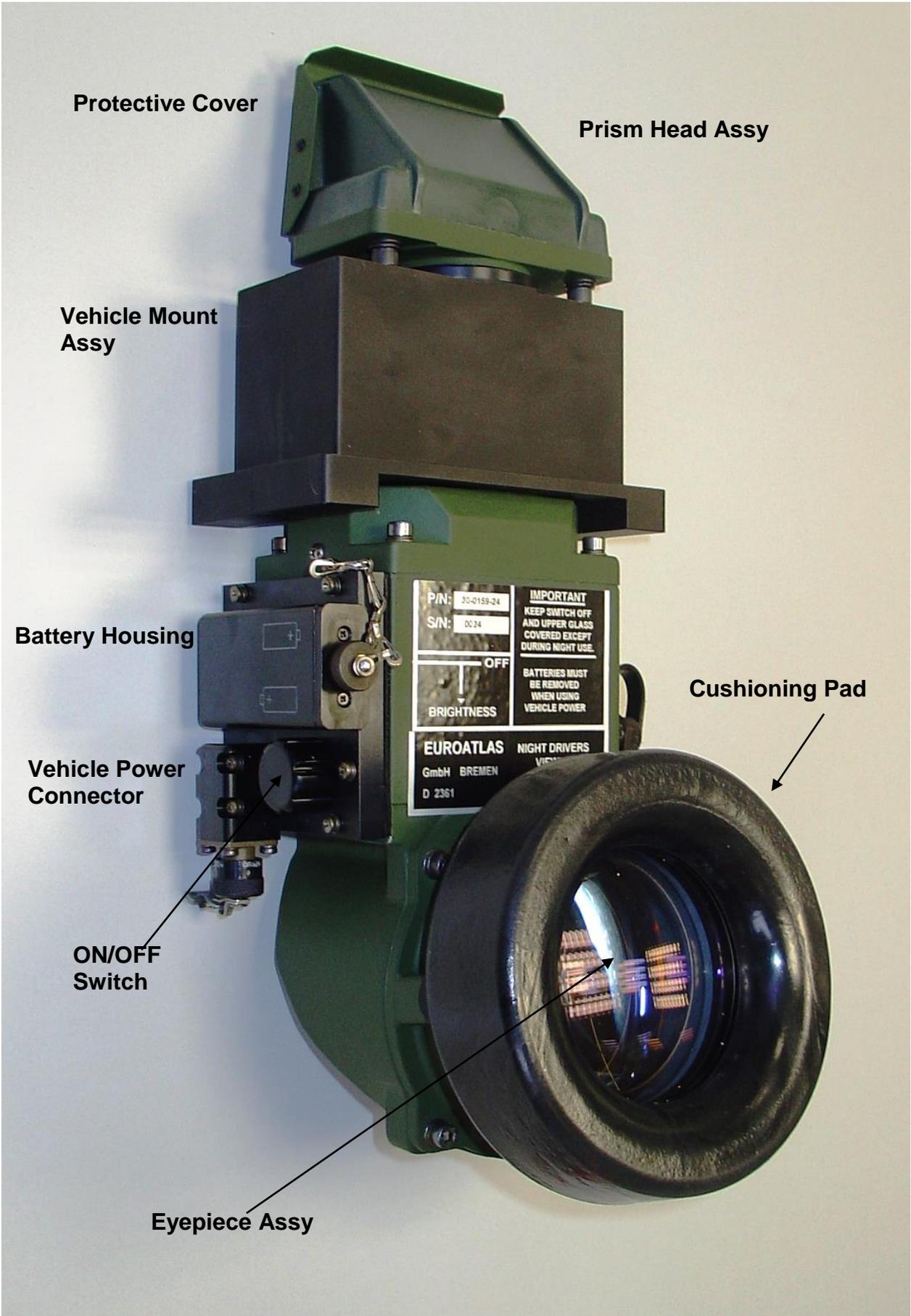


Figure 2-1 System Components and Operating Controls

- (1) Hold night viewer in upright position with head assembly facing forward. Insert night viewer into the hatch, pushing up firmly on viewer until it sits into its place.
- (2) Turn left and right locking brackets until they engage the periscope adapter block.
- (3) Tighten the locking brackets until periscope tightly fits into the hatch.

NOTE

Hold the periscope securely until both locks are firmly tightened to prevent periscope from dropping down.

- c. To connect vehicle power cable to the night viewer, proceed as follows:

- (1) Set OFF/BRIGHT rotary switch to “OFF”
- (2) Connect vehicle power cable plug to power receptacle.

2-4 PREOPERATIONAL PROCEDURE—BATTERY POWER

NOTE

The night viewer may be installed in the vehicle by performing the same operations described in paragraph 3.

- a. Battery installation proceed as follows:

- (1) Disconnect vehicle power cable.
- (2) Rotate OFF/BRIGHT rotary switch to “OFF”.
- (3) Unscrew battery compartment cap.
- (4) Insert 2x1.5V Alkaline AA battery to the battery compartment according to polarities designated.
- (5) Reinstall battery compartment cap.

NOTE

Finger-tighten battery compartment cap securely to ensure firm contact with battery.

CHAPTER 3

OPERATING INSTRUCTIONS

3-1. GENERAL

This Part contains instructions and information necessary to prepare the night viewer for operation. Included is description of operating controls and procedures for applying both vehicle and battery power.

CAUTION

If equipment fails to operate, refer to trouble-shooting instructions contained in Part 5.

CAUTION

Reinstall head assembly protective cover during bright light conditions (i.e., daylight, vehicle stopped in lighted parking area, motor pool, etc.)

3-2. TURN-ON PROCEDURE

a. To operate the night viewer, proceed as follows:

- (1) Adjust driver's seat for comfortable viewing at eyepiece.
- (2) Rotate OFF/BRIGHT rotary switch to maximum clockwise "BRIGHT" (on) position and note that a green image is visible in the eyepiece.

NOTE

The OFF/BRIGHT rotary switch is normally set to the maximum clockwise "BRIGHT" (on) position when viewing dim images. If the image display is too bright, contrast will be degraded. Brightness should therefore be adjusted for best contrast. (See Figure 3-1.) However, during the course of night operations, available ambient brightness may vary. Check for optimum viewer gain during mission.

b. Additional operating considerations are listed below.

- (1) Night viewer is set in straight-ahead (detent) position for normal driving.
- (2) The display image appears at a normal viewing distance of 50 centimeters. If the user requires reading glasses, they must be worn during operation.



Figure 3-1. Correct Image Contrast

- (3) During vehicle main weapon firing, image may disappear momentarily due to muzzle flash.
- (4) If light outside vehicle increases, reinstall daytime periscope.
- (5) If head assembly becomes rain spotted or dusty, maintain good visibility by removing night viewer from vehicle mount to clean the prism, or by reaching outside vehicle and cleaning in place. (See Section 4-7.)

3-3. TURN-OFF PROCEDURE

The night viewer is shut down according to the following procedure.

- (1) Rotate OFF/BRIGHT rotary switch to "OFF"
- (2) Disconnect vehicle power cable (if used) from night viewer, and reinstall power connector cap.
- (3) Hold night viewer firmly and unscrew it from vehicle.
- (4) Carefully lower night viewer.
- (5) Carefully wipe off any dirt or moisture from night viewer.
- (6) Remove protective cover from vehicle stowage container and install on head assembly.
- (7) Secure night viewer in vehicle stowage compartment.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

4-1. GENERAL

Systematic care, service, and inspection of equipment should be performed to ensure that the night viewer is serviceable and to prevent the future trouble. This Part therefore outlines both preventive maintenance checks and services (PMCS) and general cleaning procedures.

4-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

- a. The table shown in Table 4-1 lists the preventive maintenance checks and services to be performed daily. The Interval and Sequence No. Column lists the sequence in which a particular check or service is required and the item to be inspected. The procedure column lists both the item and applicable procedure.
- b. If the night viewer is not used daily, it should be checked and serviced immediately before and after a mission. Do not delay any daily preventive maintenance checks and services more than one week, and be sure to record all maintenance checks before sending the night viewer to a higher level of maintenance.

4-3. CLEANING

CAUTION

Clean the prism with a lens-dusting brush or lens tissue and lens cleaner only.

DO NOT USE cloth, which may scratch surfaces and degrade performance.

a. Exterior Surface

Clean the night viewer exterior surfaces as follows:

- (1) If exposed to salt water, wash off with clean, fresh water.
- (2) Remove all loose dirt, dust, and foreign matter with a clean, dry, lint-free cloth.
- (3) Wipe all exposed surfaces with a clean, dry, lint-free cloth.

(4) Remove grime with a clean, lint-free cloth dampened with clean, fresh water or mild detergent.

(5) Dry surfaces thoroughly with a clean, dry, lint-free cloth.

b. Power Receptacle

Clean the power receptacle as follows:

(1) Remove all loose dirt, dust, or foreign matter from exterior surfaces and connector contacts.

(2) Dampen a clean, dry, lint-free cloth with clean, fresh water and remove grime from connector

(3) Allow to air dry or wipe dry with a clean, dry, lint-free cloth.

Interval and Sequence No.		Item to be Inspected, Procedure
D	A	
1		OFF/BRIGHT SWITCH CONTROL Rotate OFF/BRIGHT switch control and check for power control and brightness control. Report deficiencies to higher maintenance.
	2	REMOVE BATTERY Remove battery cap and remove 2x1.5V Alkaline AA batteries after operation. Replace battery cap.
	3	CLEANLINESS OF EQUIPMENT Inspect the exterior surfaces. They should be clean, free of dust, dirt, grease, and fungus.
D: During Operation A: After Operation		

Table 4-1 Table of Preventive Maintenance Checks and Services

c. Cushioning Pad

Clean the cushioning pad as follows

- (1) Remove dirt, dust, or foreign matter with a clean, dry, lint-free cloth.
- (2) Remove grime with a clean, lint-free cloth dampened with clean, fresh water.
- (3) Wipe dry using a clean, dry, lint-free cloth.

d. Eyepiece Lens and Head Assembly

Clean the eyepiece lens and head assembly as follows:

- (1) Remove grime or smudge using lens tissue folded into a swab and moistened with lens cleaner as per steps (b) and (c).
- (2) Wipe surface gently with a lens brush or with lens tissue and lens cleaner using a circular motion and starting at center and working towards edge.
- (3) Dry surface with a clean, dry lens tissue, using circular motion described in (b) above.

CHAPTER 5

TROUBLESHOOTING

5-1. GENERAL

This Part contains troubleshooting information for the location and correction of most of the operating troubles that could occur. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections, which will help to determine probable causes and corrective actions. Tests/inspections and corrective actions should be performed in the order listed.

5-2. TROUBLESHOOTING

This manual cannot list all possible malfunctions that may occur, or include all tests or inspections and corrective actions. If a malfunction is not listed in the table shown in Table 5-1, and cannot be corrected by listed corrective actions, notify the supervisor.

Malfunction	Test or Inspection	Corrective Action
1. No image (vehicle power used)	<p>(a) Check to see if OFF/BRIGHT rotary switch is set to "OFF"</p> <p>(b) Check if vehicle power is off.</p> <p>(c) Check if head assembly cover is installed.</p> <p>(d) Check light conditions outside vehicle. If too bright, night viewer will not operate.</p> <p>NOTE: If light is too bright, night viewer will not operate and head assembly cover should be installed.</p>	<p>(a) Rotate OFF/BRIGHT rotary switch to maximum "BRIGHT" position.</p> <p>(b) Check vehicle power control. Install battery and operate night viewer.</p> <p>(c) Remove head assembly protective cover.</p> <p>(d) Point night viewer at darker scene.</p>
2. No image (battery used)	<p>(a) Check to see if OFF/BRIGHT rotary switch is set to "OFF"</p> <p>(b) Check if battery compartment cap is loose.</p> <p>(c) Check if battery is dead.</p> <p>(d) Check light outside vehicle. If too bright, night viewer will not operate.</p> <p>NOTE If light is too bright, night viewer will not operate and head assembly cover should be installed.</p>	<p>(a) Rotate OFF/BRIGHT rotary switch to maximum "BRIGHT" position.</p> <p>(b) Secure battery compartment cap.</p> <p>(c) Replace battery</p> <p>(d) Point night viewer at darker scene.</p>
	<p>(e) Check battery for proper installation.</p> <p>(f) Check if head assembly cover is installed.</p>	<p>(e) Install batteries with proper polarities indicated on the battery compartment.</p> <p>(f) Remove head assembly cover.</p>
3. Image too bright	Check if OFF/BRIGHT rotary switch is correctly adjusted.	Adjust OFF/BRIGHT rotary switch.
4. Image dim (vehicle power used).	<p>(a) Check OFF/BRIGHT rotary switch position.</p> <p>(b) Check if vehicle power is normal</p>	<p>(a) Adjust OFF/BRIGHT rotary switch for best image.</p> <p>(b) Disconnect vehicle power and install battery in night viewer.</p>
5. Image dim (battery used)	<p>(a) Check OFF/BRIGHT rotary switch position.</p> <p>(b) Check if battery is normal</p>	<p>(a) Adjust OFF/BRIGHT rotary switch for best image.</p> <p>(b) Replace battery.</p>
6. Poor image quality	<p>(a) Check if head assembly or eyepiece lens is dirty or foggy.</p> <p>(b) Check if vehicle power is normal.</p> <p>(c) Check if battery is normal.</p>	<p>(a) Clean as necessary.</p> <p>(b) Disconnect vehicle power plug and install battery in night viewer.</p> <p>(c) Replace battery.</p>

Table 5-1 Troubleshooting