

OPERATOR'S MANUAL

NIGHT VISION GOGGLES

GROUND USE

AN/PVS-5 AND AN/PVS-5A

(NSN 5655-00-150-1820) (EIC: IPD)

AN/PVS-5B

(NSN 5655-01-226-0936) (EIC: IPV)

AN/PVS-5C

(NSN 5855-01-226-0936) (EIC: IPU)

AVIATION USE

GM-6(V)1 GOGGLES

GM-6(V)2 GOGGLES

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HEADQUARTERS, DEPARTMENT OF THE ARMY

15 MAY 1993

WARNING

Equipment Limitations

To help personnel avoid injury and equipment damage when using Night Vision Goggles (NVG), read and understand the following safety precautions:

- The equipment requires some night light (moonlight, starlight, etc.) to operate. The level of performance depends upon the level of night light.
 - Night light is reduced by passing low cloud cover and objects that produce shadows.
- Ž The equipment is less effective when viewing into shadows, under low cloud cover, and other darkened areas.
- The equipment is less effective in rain, fog, sleet, snow, smoke or other reflective materials.
 - Exercise extreme caution when flying over low-contrast terrain such as snow-covered territory, sandy desert environments, large bodies of water, or grassy hills. Under ambient starlight conditions, low-contrast environments degrade visibility, thereby disguising or masking changes in the terrain. This is especially true under low-light conditions and higher speeds.

WARNING

- Exercise extreme caution when flying from high ambient light conditions to low ambient light conditions. Under low-light condition, the goggles lose some of the resolution they have under high-light conditions. Thus, flying from high-light to low-light conditions quickly reduces the sharpness and definition of terrain images.
- When flying from low-light to high-light conditions you may see honeycombing or fixed pattern noise. It is acceptable.
- Some goggles may experience a measurable loss of performance at temperatures above 100°F (38°C). This is caused by ambient heat beginning to increase thermionic emissions of the photocathode. If this begins to occur, it will appear as though you are looking through eyeglasses that are starting to fog or develop a slight haze.
- The equipment has a field of view limited to 40°, which requires appropriate scanning procedures.
- GM-6(V)1 and GM-6(V)2 NVG. If eyeglasses are worn, the upper rims of the eyeglasses can obscure the low-battery indicator.

WARNING

The full face mask AN/PVS-5, -5A -5B, and -5C configurations are not authorized to be used by pilots while flying aircraft.

The binocular assemblies for AN/PVS-5A, -5B, and -5C NVG can be used with the GM-6(V)1 and GM-6(V)2 modification. The AN/PVS-5 binocular assembly cannot be used in any modification for flying.

WARNING

All crew members with access to a set of flight controls must wear the same type of NVG.

Do not fly with NVGs in aircraft without lighting that is compatible with NVG or that does not have ON/OFF switch installed in accordance with approved maintenance work orders.

WARNING

Two major disadvantages occur when the IR illuminator is used. First, it makes the NVG an active IR system and when illuminated the operator is subject to detection by enemy systems. Second, when the illuminator is used, the battery power is consumed six times faster.

WARNING

Do not use mercury or rechargeable NiCad batteries. Using these batteries could result in a system failure which could cause personal injury.

WARNING

Danger of Explosion

Do not transport batteries in pockets, or other containers, containing metal objects such as coins, keys, etc. Metal objects can short circuit batteries and cause them to become very hot. The BA-5567/U lithium batteries could explode.

WARNING

The BA-5567/U lithium battery contains sulphur dioxide gas which is under pressure and should be handled in the following manner.

- The BA-5567/U lithium batteries have safety vents to prevent explosion. When they are venting sulfur dioxide gas, you may smell it (very irritating rotten egg odor) or hear the sound of gas escaping. When the safety vents have operated, the batteries are fairly safe from bursting, but will be hot and must be handled with care to prevent injury from burns.

WARNING CONTINUED

- Do not heat, puncture, disassemble, short circuit, attempt to recharge, or otherwise tamper with the batteries.
- Turn off the equipment if the battery compartment becomes unduly hot. Do not open the battery compartment, but turn in the goggles or the battery pack to the maintainer and report the problem.
- If you inhale sulphur dioxide, seek medical attention.

FIRST AID

For first aid or artificial respiration, see FM 21-11, First Aid for Soldiers.

WARNING

Toxic Material

The image intensifier phosphor screen in each monocular assembly contains toxic materials.

- A broken image intensifier maybe caused from damage to the binocular assembly, especially if the monocular housing is cracked by force.

WARNING CONTINUED

- If an image intensifier breaks, be extremely careful to avoid inhaling the phosphor screen material. Do not allow the material to come in contact with the mouth or open wounds on the skin.
- If the phosphor screen material contacts your skin, wash it off with soap and water and seek medical attention as soon as possible.
- If you inhale/swallow any phosphor screen material, drink a lot of water, induce vomiting, and seek medical attention as soon as possible.

WARNING

HIGH-LIGHT CUTOFF FEATURE

Ground Use only. The full face mask AN/PVS-5C configuration contains a high-light cutoff feature, integrated into the face mask, designed to protect the image intensifier from exposure to high-light levels for long periods of time. When exposed to high-light levels for approximately 90 to 120 seconds, the goggle power is automatically cut off. If the cutoff feature should activate while the goggles are in use during nighttime conditions, restore goggles power by turning the rotary switch OFF and back ON. Aviation GM-6(V)1 and GM-6(V)2 does not have this feature.

WARNING

Under arctic conditions the cold weather mask or other covering (band aid) should be worn under the goggles to prevent frost bite at possible facial contact points.

TECHNICAL MANUAL

Headquarter

Department of the Army

No. 11-5855-238-10

Washington, DC, 15 May 1993

OPERATOR'S MANUAL NIGHT VISION GOGGLES

GROUND USE

AN/PVS -5 AND AN/PVS-5A

(NSN 5855-00-150-1820) (EIC: IPD)

AN/PVS-5B

(NSN 5855-01-228-0938) (EIC: IPV)

AN/PVS-5C

(NSN 5855-01-228-0936) (EIC: IPU)

AVIATION USE

GM-6(V)1 AND GM-6(V)2

REPORTING ERRORS AND RECOMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures in this manual, write or tell us about it. Address your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) to: Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LM-LT, Fort Monmouth, NJ 07703-5007. A reply will be furnished to you.

* This manual supersedes TM 11-5855-238-10, 1 April 1988 and all changes.

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HOW TO USE THIS MANUAL

Usage

1. You must familiarize yourself with the entire manual before operating the equipment. Read and follow all WARNINGS.
2. The End item Code (EIC) appears on the front cover for your convenience to use on various forms.

Manual Overview

1. WARNINGS and a table of contents are provided at the front of the book. The table of contents includes the paragraph number, paragraph title, and page number for each chapter. Each chapter is divided into sections and sections into paragraphs. Chapter titles are boxed on the front cover. At the right edge of each box is a blackened area. This blackened area matches a black mark appearing on the first page of that chapter in the manual. This manual is divided into four chapters.

a. Chapter 1 (Aviation and Ground Use) contains an introduction to this manual with functional description, physical description, equipment data, and principles of operation of the goggles. Full view illustrations of the six models are provided to assist you in identification of major components. The information in chapter 1 is for both aviation and ground use unless otherwise identified.

b. Chapter 2 contains Aviation GM-6(V)1 and GM-6(V)2 goggles information for the operator, including operator's checks, illustrations, instructions for operation under usual conditions, and operation under unusual conditions. Several test procedures are included.

c. Chapter 3 contains Ground goggles information for the operator, including illustrations, and instructions for operation in usual conditions, operation in unusual conditions, and a table with preventive maintenance checks and services (PMCS).

d. Chapter 4 contains Aviation and Ground use maintenance data. It also provides operator troubleshooting procedures and maintenance procedures. The information in this chapter is for both aviation and ground use unless otherwise identified.

2. Appendices are for the following: References to related subject matter such as forms, associated technical publications, and other miscellaneous documents; Components of End Item List; Additional Authorization List; and Expendable and Durable Items List. The information in the appendices are for both aviation and ground use unless otherwise identified.

CHAPTER 1.

INTRODUCTION

Section I. General Information

1-1 SCOPE

This manual provides instruction for the operator to use and maintain the Night Vision Goggles (NVG) AN/PVS-5, AN/PVS-5A, AN/PVS-5B, and AN/PVS-5C for Ground (use figures 1-1, 1-2, and 1-3.) For Aviation, use GM-6(V)1 and GM-6(V)2 at figures 1-4 and 1-5.

1-2 MAINTENANCE FORMS AND PROCEDURES

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System, for Ground use for NVG. Use DA Pam 738-751, Functional Users Manual for the Army Maintenance Management System - Aviation (TAMMS-A) for Aviation NVG; or AR 700-138, Army Logistics Readiness and Sustainability.

1-3 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 this equipment.

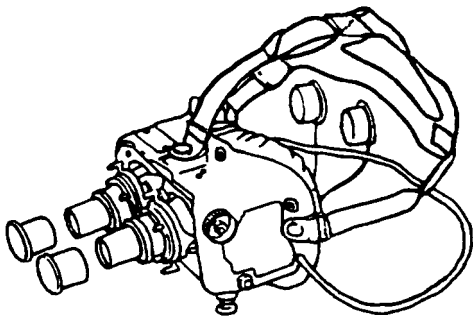


Figure 1-1. AN/PVS-5 and AN/PVS-5A NVG.

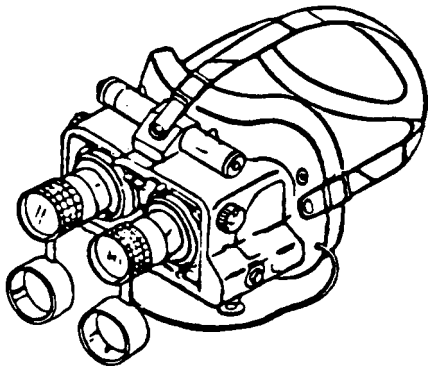


Figure 1-2. AN/PVS-5B NVG.

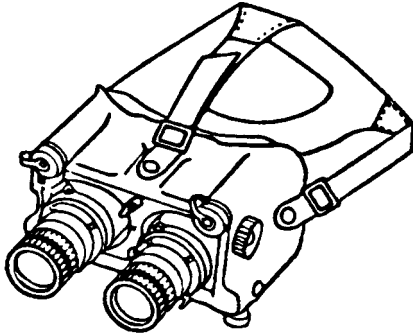


Figure 1-3. AN/PVS-5C NVG.

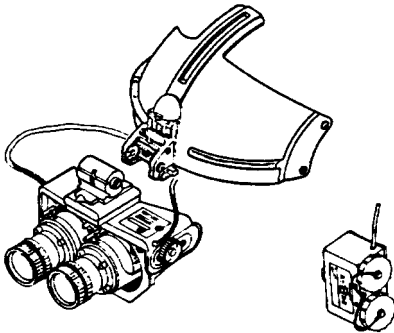


Figure 1-4. GM-6 NVG with AN/PVS-5C Binocular Assembly.

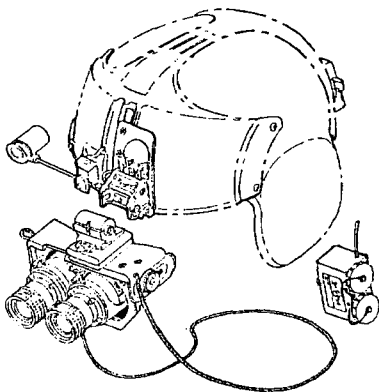


Figure 1-5. GM-6(V)2 NVG with AN/PVS-5C Binocular Assembly Shown.

1-4 CORROSION PREVENTION AND CONTROL

Corrosion prevention and control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this equipment be reported so that the problem can be corrected and improvements made to prevent the problem in future equipment.

While corrosion is typically associated with rusting metal, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these other materials may be a corrosion problem.

If a corrosion problem is identified, report it using Standard Form (SF) 368, Product Quality Deficiency Report. Use keywords such as "corrosion," "rust," "deterioration," or "cracking" to ensure that the information is identified as a CPC problem. Submit the form to the address specified in DA Pam 738-750 or DA Pam 738-751.

1-5 DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

For procedures to destroy this equipment to prevent its use by the enemy, refer to TM 750-244-2, Procedures for Destruction of Electronic Materiel to Prevent Enemy Use.

1-6 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your NVG need 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 SF 368, Product Quality Deficiency Report. Mail it to Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ED-PH, Fort Monmouth, NJ 07703-5007. We'll send you a reply.

1-7. WARRANTY INFORMATION

Some systems will be covered by a warranty, The warranty expiration date is located on the face mask. The image intensifier has the warranty expiration date marked on it. Report all defects to your maintainer, who will take appropriate action.

TM 11-5855-238-10

1-8. NOMENCLATURE CROSS-REFERENCE LIST

COMMON NAME	OFFICIAL NOMENCLATURE
Battery Pack	Power Pack
Bracket	Viewer Mount Assembly
Clamp Knob	Knob
Velcro	Hook-and-pile Fastener
Visor Mount Assembly	Mount Assembly
Rotary Switch Knob	Knob

1-9 LIST OF ABBREVIATIONS

CPC	Corrosion Prevention and Control
CVC	Combat Vehicle Crewman
FOV	Field Of View
IR	Infrared
LED	Light-emitting Diode
NVG	Night Vision Goggles
NSN	National Stock Number

1-10 GLOSSARY

BINOCULAR ASSEMBLY. The binocular assembly consists of two monocular assemblies and frame assembly. The binocular assembly mounts in the face mask assembly or the viewer mount assembly or offset viewer mount assembly.

BLACK SPOTS. These are cosmetic blemishes in the image intensifier of the goggles or dirt or debris on the lenses. Black spots are acceptable as long as they do not interfere with image viewing. No action is required if this condition is present unless the spots interfere with the operator's ability to view the outside scene or the ability to perform the mission.

BRIGHT SPOTS. These can be defects in the image area produced by the NVG. This condition is caused by a flaw in the phosphor screen. A bright spot is a small, nonuniform, bright area that may flicker or appear constant. Cup your hands over the lens to block out all light. Bright spots usually go away when the light is blocked out and are cosmetic defects that are signal induced. Bright spots are acceptable if they do not interfere with the operator's ability to view the outside scene and the ability to perform the mission.

CAUTION. Condition, practices, or procedures that, if not strictly observed, could result in damage to, or destruction of, equipment or loss of mission effectiveness.

TM 11-5855-238-10

CHICKEN WIRE. Chicken wire is a cosmetic defect. This defect is not very common. An irregular pattern of dark thin lines in the field of view either throughout the image area or in parts of the image area. Under worst case condition, these lines will form hexagonal or square-wave shaped lines. These lines are caused by defective fibers that do not transmit light occurring at the boundaries of fiber bundles in the output optic of the image intensifier. No action is required if this condition is present unless it interferes with viewing the image and interfere with the operator's ability to perform the mission.

DARK (OR DARK AREA). A place in which there is very little light. It does not mean total darkness. Generally, this means conditions similar to below a quarter-moon or starlit night.

DARK ADAPTED. Having ones eyes adjusted to the goggles output under low-light conditions. This takes at least 10 minutes. However, if you have just been exposed to bright sunlight, dark adaptation will take longer.

DIOPTER. A unit of measure used to define eyes correction. Adjustments to the eyepiece focus ring will provide a clearer image in each eye.

EDGE GLOW. This is a defect in the image area of the NVG. Edge glow is a bright area (sometimes sparkling) in the outer portion of the viewing area. To check for edge glow, cup your hand over the objective lens to block out all light. Do not fly or use if edge glow is present.

EMISSION POINT. A steady or fluctuating pinpoint of bright light in the image area that does not go away when all light is blocked from the objective lens of the monocular. The position of an emission point within the image area of the monocular does not move. An emission point should not be confused with a light source in the distance. Emission points are acceptable as long as they do not interfere with the operator's ability to view the outside scene and the ability to perform the mission.

EYEPIECE LENS ASSEMBLY. Consists of an eyepiece lens cell. It attaches to the rear of the monocular housing and adjusts for variations in the user's eyesight.

FACE MASK ASSEMBLY. The face mask assembly houses the binocular assembly. The AN/PVS-5 and -5A face mask's configuration is different than the -5B, or the -5C face mask.

FIXED-PATTERN NOISE OR HONEYCOMB. This is usually a cosmetic blemish in the image area characterized by a faint hexagonal (honeycomb) pattern throughout the viewing area that most often occurs at highlight levels or when viewing very bright lights. Fixed-pattern noise is inherent in the structure of the fiber optics and can be seen in every image intensifier if the light level is high enough. This condition is acceptable as long as the pattern does not interfere with viewing the image.

FLASHING. This is a defect in the image area of the NVG. The image appears to flicker or flash. This can occur in one or both image intensifier tubes. If there is more than one flicker, check for loose wires or battery cap or weak batteries. Do not fly or use unless this condition is corrected.

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FLICKERING. This is a defect in the image area of the NVG. See “flashing.”

IMAGE DISPARITY. This condition exists when there is a difference in performance between the two image intensifiers. This is usually noted by one monocular appearing brighter than the other. This condition is acceptable unless the difference is significant enough to interfere with the ability to perform the mission. No action is required if this condition is observed unless it interferes with the operator’s ability to view the outside scene or the ability to perform the mission.

IMAGE DISTORTION. This problem is evidenced by vertical or horizontal objects, such as trees, poles, runways, or horizons that appear to wave or bend when you move your head (with NVG) vertically or horizontally. For aviation, ground surfaces in the direction of hover may appear to swell or sink. Ensure that you are viewing through the center of the NVG when performing this check. The problem is within the image intensifier and not the lenses. A one-time check for distortion is required prior to the first use of each image intensifier as prescribed by TM 11-5855-238-23&P.

IMAGE INTENSIFIER. An electro-optical device that detects and amplifies ambient light to produce a visual image. It consists of a photocathode, microchannel plate, phosphor screen optics, and integral power supply.

INFINITY FOCUS. Adjustment of the objective lens so that a distant object, such as a star or the point light on a distant tower, forms the sharpest image.

INTERMITTENT OPERATION. This is a defect in the image area of the NVG. See "flashing."

MICROCANNEL PLATE. A current-multiplying optical disk that intensifies the electron image produced by the photocathode.

MOUNT ASSEMBLY. This is the GM-6(V)1 visor mount assembly that replaces the standard SPH-4 helmet's visor housing. The viewer mount assembly attaches to this mount; however, it is for use with the GM-6(V)1 center mounted viewer mount assembly and not for the GM-6(V)2 offset visor mount assembly. See also "offset visor mount assembly."

MONOCULAR ASSEMBLY. Consists of an eyepiece lens, image intensifier, and objective lens assembly.

NOTE. Highlights an essential operating or maintenance procedure, condition, or statement.

NO-TIME BATTERY. A battery that has not exceeded its shelf life and has never been used.

OBJECTIVE LENS ASSEMBLY. This consists of an objective lens cell and an objective focus knob. It attaches to the front of the monocular housing and adjusts for variations in distance to the viewed area or object.

OFFSET VIEWER MOUNT ASSEMBLY, GM-6(V)2. A specialized mount that holds the AN/PVS-5A, -5B, or -5C binocular assembly and mates to the offset visor mount.

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OFFSET VISOR MOUNT ASSEMBLY, GM-6(V)2. A specialized mount assembly used with SPH-4 helmets modified with the helmet sight assembly. Mates to offset viewer mount; cannot be used with the standard viewer mount.

PHOTOCATHODE. The input optic of an image intensifier that absorbs light energy and in turn releases electrical energy in the form of an electron image.

POWER PACK, GM-6(V)1 and GM-6(V)2. A component of the Aviation modification that attaches to the back of the user's helmet and provides power to the goggles. Power is supplied either from the aircraft power converter through the power pack or by batteries contained in compartments inside the power pack. The battery pack accepts either two BA-5567/U lithium batteries or four BA-3058/U AA alkaline batteries (two in each compartment).

POWER PACK MOUNT CONNECTOR, GM-6(V)1 and GM-6(V)2. The connector between the power pack and visor mount assembly or offset visor mount assembly.

SCINTILLATION. A faint, random, sparkling effect throughout the image area. Scintillation is a normal characteristic of the image intensifier and should not be confused with emission points. Scintillation is more pronounced under low-light conditions. Also called "video noise."

SHADING. This is a defect in the image area of the goggles when the photocathode in the image intensifier is slowly dying. Each monocular should portray a perfect circle when adjusted correctly. If shading is present, you will not see a fully circular image. Shading always begins on the edges and moves inward. Do not fly if shading is present in a monocular.

VIEWER MOUNT ASSEMBLY (Bracket), GM-6(V)1. This standard viewer mount assembly houses the binocular assembly and mates to the visor mount assembly.

WARNING. A condition, practice, or procedure that, if not strictly observed, could result in long term health hazard, injury to or death of personnel.

ZERO TIME BATTERY. See No-time battery.

Section II. EQUIPMENT DESCRIPTION

1-11 EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

WARNING

All crew members with access to a set of flight controls must wear the same type of NVG.

Aircraft lighting that may not be compatible or acceptable with NVG will interfere with aviator's goggles performance, such as glare on the aircraft windscreen.

WARNING CONTINUED

Adjust speed to prevent over flying the field of view when conditions of possible reduction or loss of vision exists.

WARNING

Equipment Limitations

To help personnel avoid injury and equipment damage when using NVG, read and understand the following safety precautions:

- The equipment requires some night light (moonlight, starlight, etc.) to operate. The level of performance depends upon the level of night light.
- Night light is reduced by low cloud cover and objects that produce shadows.
- The equipment is less effective when viewing into shadows and other darkened areas.
- The equipment is less effective in rain, fog, sleet, snow, smoke or other reflective materials.

WARNING CONTINUED

- Exercise extreme caution when flying over low-contrast terrain such as snow-covered territory, sandy desert environments, large bodies of water, or grassy hills. Under ambient starlight conditions, low-contrast environments degrade visibility, thereby disguising or masking changes in the terrain. This is especially true under low-light conditions and higher speeds.
- Exercise extreme caution when flying from high ambient light conditions to low ambient light conditions. Under low-light conditions, the goggles lose some of the resolution they have under high-light conditions. Thus, flying from high-light to low-light conditions quickly reduces the sharpness and definition of terrain images.
- When flying from low-light conditions to high-light conditions you may see honeycomb or fixed pattern noise. This is acceptable.

WARNING CONTINUED

- Some goggles may experience a measurable loss of performance at temperatures above 100°F (38°C). This is caused by ambient heat beginning to increase thermionic emissions of the photocathode. If this begins to occur, it will appear as though you are looking through eyeglasses that are starting to fog or develop a slight haze.
- The equipment has a field of view limited to 40°, which requires appropriate scanning procedures.

WARNING

The full face mask AN/PVS-5, -5A, -5B, and -5C configurations are not authorized to be used by pilots while flying aircraft.

The binocular assemblies for AN/PVS-5A, -5B, and -5C NVG can be used with the GM-6(V)1 and GM-6(V)2 modifications for aviation. The AN/PVS-5 binocular assembly can not be used in any modification for flying.

WARNING

Do not use mercury or rechargeable NiCad batteries. Using these batteries could result in a system failure, which could cause personal injury.

WARNING

Danger of Explosion

Do not transport batteries in pockets, or other containers, containing metal objects such as coins, keys, etc. Metal objects can short circuit batteries and cause them to become very hot. The BA-5567/U lithium batteries could explode.

a. The NVG amplifies light from the night sky (moon, stars, skyglow, etc.) to provide night vision for the operator. Terrain features are more visible when viewed through the goggles.

b. Ground use. When ambient light is not available or is otherwise inadequate for viewing the area, the NVG have an auxiliary infrared (IR) light source for close range illumination of objects up to 6.5 feet (two meters) from the goggles.

c. Operation under conditions of low ambient light levels will produce scintillation and/or video noise.

d. Aviation use. The GM-6(V)1 and GM-6(V)2 visor mounted goggles have a flip-up capability for stowing away from the eyes.

e. Ground use. The AN/PVS-5, -5A, -5B, -5C goggles can be used with or without the combat vehicle crewman's (CVC) helmet.

f. The goggles can be used for reading, performing manual tasks, patrolling, medical aid, construction work, mobile equipment operation, driving, walking, air support, surveillance during darkened conditions, etc.

g. The goggles have a limited or marginal capability operating through rain, fog, sleet, snow, blowing sand, or smoke.

h. Ground use. The NVG are comprised of a face mask (AN/PVS-5, -5A, -5B AND -5C) and the binocular assembly.

i. Aviation use, NVG are composed of a viewer mount assembly (GM-6(V)1) or offset viewer mount (GM-6(V)2), visor mount assembly (GM-6(V)1) or offset visor mount assembly (GM-6(V)2, binocular assembly and power pack.

j. The NVG can be adjusted for distance between the operator's eyes (eyespan), vertical distance, tilt, eye relief, diopter settings, and focus settings.

k. Ground use. The AN/PVS-5C face mask assembly contains a high-light cutoff circuit to protect the image intensifier.

l. Sacrificial filter caps are provided for the AN/PVS-5B and -5C binocular assemblies to protect the objective lenses in sandy and dusty areas.

m. The adjustable frame assembly consists of a frame and lever clamp (wing nut) that houses the binocular assembly.

1-12. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (See figs. 1-6 thru 1-11)

a. Monocular assembly. Amplifies the available light. Consists of an eyepiece lens assembly, image intensifier and an objective lens assembly.

b. Objective lens caps. Protects the objective lens from bright light, dust, dirt, and scratching during storage.

c. Objective lens. Focuses the light on the image intensifier.

d. Objective focus knob. Used to focus the objective lens from 10-inches to infinity.

e. Diopter adjustment ring. Adjusts the eyepiece for individual eye acuity within the compensation range of +2 to -4 diopters.

f. Lever clamp (Wing Nut). Allows the operator to adjust the binoculars for the desired eyespan distance.

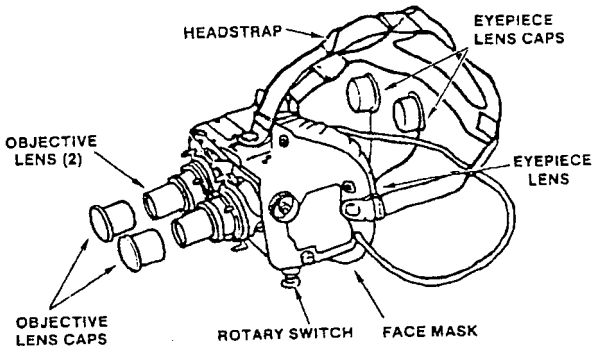


Figure 1-6. AN/PVS-5 and AN/PVS-5A NVG Major Components (Ground Use).

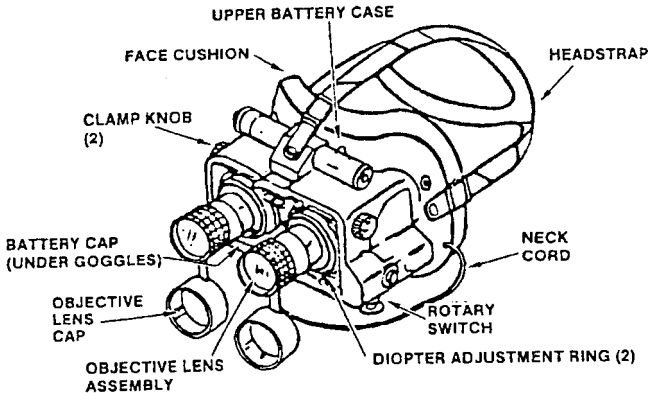


Figure 1-7. AN/PVS-5B NVG Major Components (Ground Use).

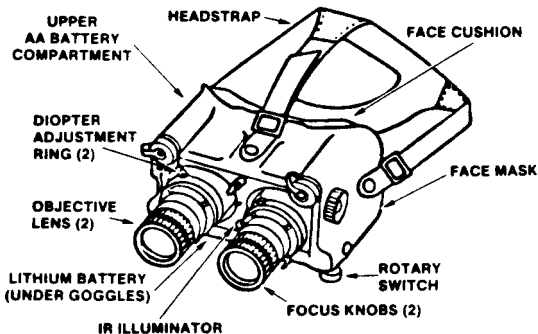


Figure 1-8. AN/PVS-5C NVG Major Components (Ground Use).

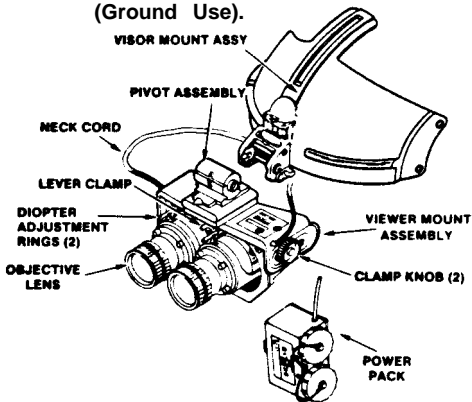


Figure 1-9 GM-6(V)1 NVG Major Components (Aviation Use) Shown with AN/PVS-5C Binocular Assembly.

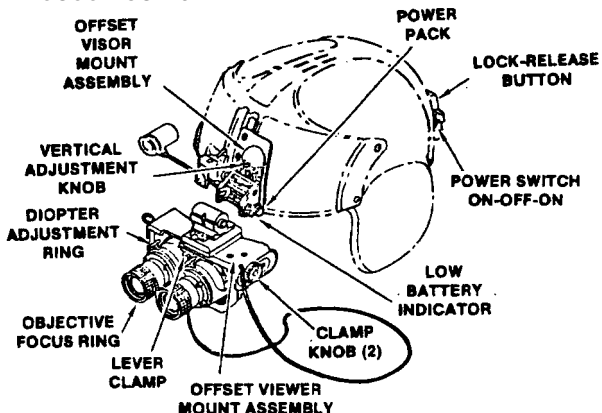


Figure 1-10. GM-6(V)2 NVG Major Components (Aviation Use) Shown with AN/PVS-5C Binocular Assembly.

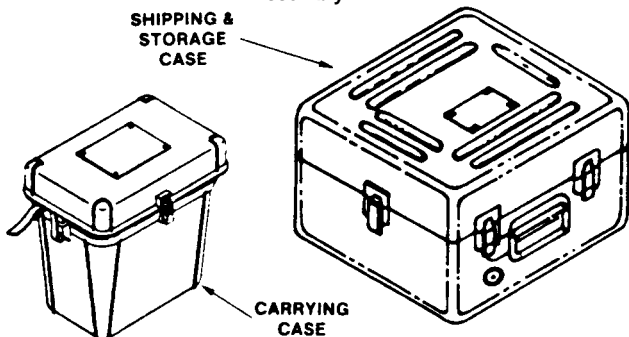


Figure 1-11. Carrying Case and Shipping and Storage Case for NVG.

g. Clamp knobs. Adjusts for tilt and eye relief.

h. IR illuminator for Ground use. Provides light for viewing approximately 6.5 feet (2 meters) in low ambient light conditions.

i. Rotary switch knob. Ground Use. The rotary switch knob activates the goggles. It has three positions ON/OFF/IR. The rotary switch is not used on the GM-6(V)1 or GM-6(V)2.

j. Battery compartment. Ground Use. This is where the battery(s) is placed for NVG. The AN/PVS-5 and -5A have one battery compartment. The AN/PVS-5B has two battery compartments and -5C has three battery compartments.

k. Face mask assembly. Ground Use. The face mask assembly houses all the components for AN/PVS-5, -5A, -5B, and -5C goggles.

l. Power Pack. Aviation Use. The power pack is used to power the GM-6(V)1 and GM-6(V)2 goggles. The power pack has two battery compartments. Each compartment will hold one lithium battery (BA-5567/U) or two AA batteries (BA-3058/U) placed in the AA battery cartridge (fig. 1-12).

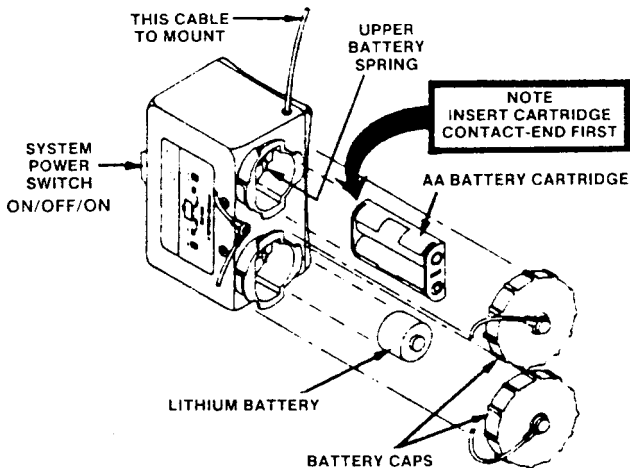


Figure 1-12. Power Pack.

m. Viewer mount assembly (Bracket) for GM-6(V)1. Aviation Use. The viewer mount assembly replaces the AN/PVS-5A, -5B, or -5C face mask assembly and houses the binocular assembly (AN/PVS-5A, -5B, or -5C). It includes the low-battery indicator.

n. Visor mount assembly for GM-6(V)1. Aviation Use. This component replaces the standard visor guard on the SPH-4 helmet. It contains a vertical adjustment for moving the binocular up or down and also allows the binocular to be stowed in the up position away from the eyes. It also permits the binocular to be pulled off or to break away during a crash

load of 10g or more. It includes the low-light battery voltage indicator.

o. CVC Helmet vee-strap assembly and snaps. Ground Use. Used to secure the goggles to the CVC helmet (fig. 3-8).

p. Headstrap. Ground Use. The headstraps for AN/PVS-5, -5A, -5B, and -5C are worn to hold NVG on the head.

q. Eyepiece lens caps. Protects the eyepiece lens.

r. Eyepiece lens. Focuses an image for the operator to view. The AN/PVS-5 eyepiece lenses are not interchangeable with the -5A -5B, and -5C eyepiece lenses.

s. Demisting shields. Two are used on the eyepiece lens to prevent fogging.

t. Sacrificial filter caps. Two each are used on the objective lens (AN/PVS-5B and -5C binocular assembly only) in sandy and dusty areas.

u. Mask cushion. Ground Use. Acts as an interface between the face mask and the user's face.

v. Carrying case. The carrying case is made of molded plastic with polyethylene foam inserts for protection of the goggles when not in use. A carrying strap is provided for the case.

w. Shipping and storage case. The shipping and storage case is a hard case (either of aluminum alloy or polyethylene) to ship or store the carrying case with goggles.

x. Offset viewer mount assembly for GM-6(V)2. Aviation Use. The offset viewer mount assembly houses the binocular assembly (AN/PVS-5A, -5B, and -5C).

y. Offset visor mount assembly for GM-6(V)2. Aviation Use. This component is a specialized mount assembly for use with the SPH-4 helmets modified with the helmet sight assembly. It contains a vertical adjustment for moving the binocular up or down and also allows the binocular to be stowed in the up position away from the eyes. It also permits the binocular to be pulled off or to break away during a crash load of 10g or more. It includes the low-light battery voltage indicator.

1-13 DIFFERENCES BETWEEN MODELS

a. Aviation Use.

(1) GM-6(V)1 and GM-6(V)2 NVG were designed to serve the needs of the aviation community. These two models are the same except the GM-6(V)1 is center mounted and the GM-6(V)2 is offset. The unique feature is that a viewer mount or offset viewer mount replaces the face mask. This increases peripheral vision permitting aviators to read instruments more easily. These NVG are attached to the helmet visor by a viewer mount or an offset viewer mount assembly. These assemblies have a flip-up and break-away feature. These NVG are powered by a power pack. These models can house any binocular assembly for the AN/PVS-5A, -5B, or -5C. The binocular assembly must contain the same type of objective lenses. That means both must be AN/PVS-5A, -5B, or -5C. The GM-6(V)1 and GM-6(V)2 replaces the GX-5 flip-up NVG and the Cut-A-Way NVG.

b. Ground Use.

(1) The AN/PVS-5 AND -5A are similar in operation and function. They differ in the mechanical design of the eyepiece assembly, the threaded interface between the eyepiece assembly and the image intensifier, and the rotary switch. Therefore, the eyepiece assembly and image intensifier are not interchangeable between these two models. The objective lenses are interchangeable and must be matched or changed in pairs. That means both must be AN/PVS-5 or -5A. The rotary switch on the AN/PVS-5A incorporates a feature which requires you to pull on the rotary switch and turn to IR position to turn on the IR illuminator while the AN/PVS-5 turns on the IR without pulling out the switch. Both models use a single 3.0 volt lithium battery (BA-5567/U) as the power source.

CAUTION

Ground Use. Do not install both AA and lithium batteries at the same time, to avoid damage to the equipment, overheating of batteries, or quick drainage of battery power.

(2) The AN/PVS-5B is similar in operation and function to the AN/PVS-5 and -5A except the AN/PVS-5B has an additional battery compartment that allows the use of two 1.5 volt alkaline AA batteries (BA-3058/U) as an alternate power source. The objective lenses are interchangeable and must be matched or changed in pairs. That means both must be AN/PVS-5B. The objective lenses are improved which must not be interchanged with other models. Unlike the AN/PVS-5 and -5A, the objective lens caps are attached to the unit.

(3) The AN/PVS-5C is similar to the AN/PVS-5B except that the -5C has slightly larger objective lenses. The objective lenses are interchangeable and must be matched or changed in pairs. That means both must be AN/PVS-5C. The AN/PVS-5C also has a high-light cutoff feature built into the face mask. The high-light cutoff feature causes the goggles to shutdown when exposed to room level light or greater for approximately one minute. Goggles with this feature are not designed for piloting aircraft.

1-14 EQUIPMENT DATA

The following table provides information pertaining to the operational and electrical data.

Table 1-1. Equipment Data

ITEM	LIMITS
Operational Adjustment Limits	
Vertical	0.768 in (19.5 mm) Total Travel, Minimum
Fore and Aft	0.630 in. (16 mm) Total Travel, Minimum
Eyespan	0.827 in. (21 mm) Total Travel (2.835 in. (72 mm) to 2.047 in. (52 mm))
Tilt	25° Total
Eyepiece Focus	+2 to -4 Diopters, minimum
Objective Focus	10 in. (254 mm) or 4.724 in. (12 cm) to infinity

Table 1-1. Equipment Data - Continued

Electrical Data

Voltage Requirements	3.0 vdc Nominal
----------------------	-----------------

Battery, Lithium (BA-5567/U)

Voltage	3.0 vdc
---------	---------

Cell Life (one lithium battery)

100°F	13-16 hours
70°F	13-16 hours
0 ° F	9-10 hours
-20°F	5-8 hours

Battery, Two AA Alkaline (BA-3058/U)

Voltage	1.5 vdc (two batteries required for 3.0 vdc)
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Cell Life (two batteries)

100°F	10-22 hours
70 ° F	10-22 hours
0 ° F	5-10 hours
-20°F	1-3 hours

Weight, NVG

Weight	1.9 pounds
--------	------------

1-15 MECHANICAL FUNCTIONS

WARNING

Do not use mercury or rechargeable NiCad batteries. Using these batteries could result in a system failure which could cause personal injury.

The mechanical functions of the goggles allow for differences in the physical features of individual operators and provide for operating the system. These functions include on-off power, adjustment for eyespan distance, vertical travel, tilt angle, fore-and-aft adjustment for the eye relief, diopter eyepiece focus, and objective lens focus. The mechanical controls are identified in figure 1-13 through 1-16.

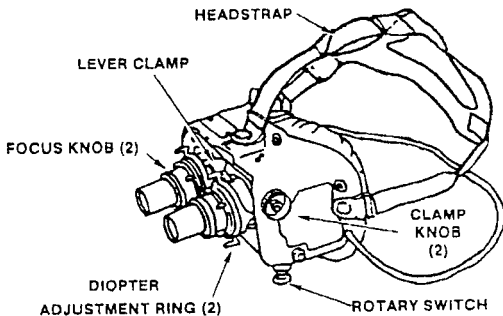


Figure 1-13. Mechanical Controls for NVG, AN/PVS-5 and -5A.

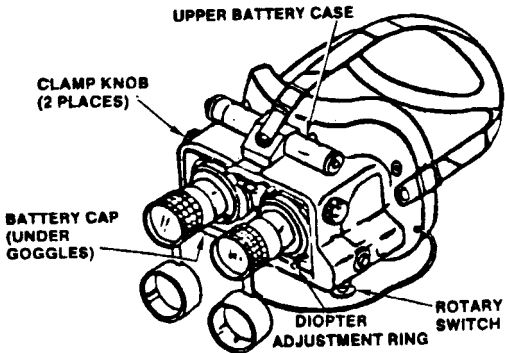


Figure 1-14. Mechanical Controls for NVG, AN/PVS-5B.

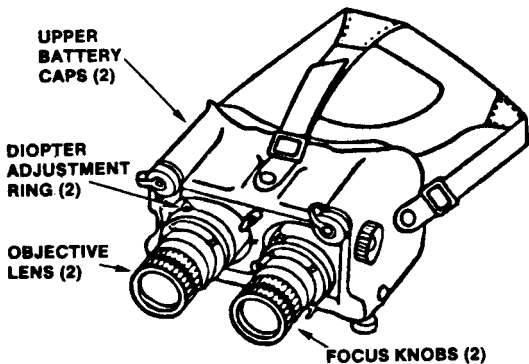


Figure 1-15. Mechanical Controls for the AN/PVS-5C.

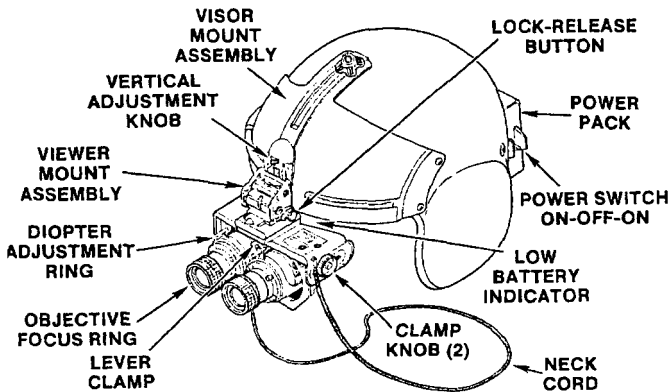


Figure 1-16. Mechanical Controls for the GM-6(V)1 (GM-6(V)2 is similar). The AN/PVS-5C binocular assembly is shown.

1-16 OPTICAL FUNCTIONS

a. The binocular assembly is an electro-optical system consisting of two monocular with identical optical trains and functions (fig. 1-17). Each monocular has an objective lens, an image intensifier, and an eyepiece lens. The objective lens collects the ambient light reflected from the scene by the moon, stars, or night sky, inverts the image and then focuses the image on the image intensifier. Inside the image intensifier, a photocathode converts the light into electrons, a microchannel plate amplifies the electron image, and the electrons then strike a phosphor screen, The phosphor

screen creates a visible image which is, in turn, re-inverted by the fiber optic and transmitted to the eyepiece where the operator can see the intensified image in its proper 1:1 perspective (unity magnification).

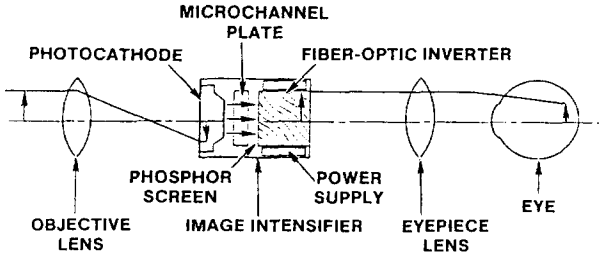


Figure 1-17. Optical Functional Diagram.

1-17. ELECTRONIC CIRCUIT FUNCTION

The electronic circuit regulates the direct-current voltage from batteries to the image intensifiers as required.

a. Power. The electronic circuit is powered by replaceable batteries. The AN/PVS-5, -5A, -56, -5C goggles are powered by 3.0 volt lithium batteries. The -5B and -5C goggles have two additional battery compartments which use 1.5 volt alkaline batteries (BA-3058/U). The GM-6(V)1 and GM-6(V)2 models use the power pack which is powered by either 3.0 volt lithium batteries (BA-5567/U) or AA 1.5 volt alkaline batteries (BA-3056AJ).

b. Electrical Function.

(1). GM-6(V)1 and GM-6(V)2 NVG (Aviation Use). Power is supplied to the components through the power pack's 3-position, ON/OFF/ON switch as follows:

(a) Primary ON Position - Power is drawn from the upper (primary) battery compartment to energize the binocular. When the voltage drops to 2.4 vdc, a low-battery indicator located on the visor at the base of the visor mount or offset visor mount assembly comes on indicating approximately 30 minutes of operating time left on that battery compartment depending on temperature.

(b) OFF Position - With the switch in the OFF position, the circuit is not energized from either battery compartment.

WARNING

GM-6(V)1 and GM-6(V)2 NVG. If eyeglasses are worn, the upper rims of the eyeglasses can obscure the low-battery indicator.

(c) Alternate ON Position - Power is drawn from the lower (alternate) battery compartment to energize the binocular. When the voltage drops to 2.4 vdc, a low-battery indicator located on the visor at the base of the visor mount or offset mount assembly comes on indicating approximately 30 minutes of operating time left on that battery compartment.

(2). AN/PVS-5, -5A, -5B, and -5C (Ground use). Power is provided from the batteries to the components through the rotary switch ON/OFF position. The rotary switch knob is pulled down and turned to the IR position for close reading.

CHAPTER 2.
OPERATING INSTRUCTIONS FOR AVIATION
GM-6(V)1 AND GM-6(V)2 GOGGLES

Section I. Description and Use of Operator's Controls
and Indicators.

NOTE

The GM-6(V)1 AND GM-6(V)2 NVG are precision electro-optical instruments, so handle them carefully. If the equipment fails to operate, refer to the Troubleshooting Procedures in Chapter 4, Section II.

2-1 OPERATOR'S CONTROLS AND INDICATORS

a. The GM-6(V)1 AND GM-6(V)2 NVG are designed to attach to the aviators helmet and to correct for most differences in eyesight. The controls and indicators are the same. The difference is the GM-6(V)1 mounts in the center of the helmet and the GM-6(V)2 is offset mounted. Figure 2-1 and Table 2-1 describe the controls and indicators.

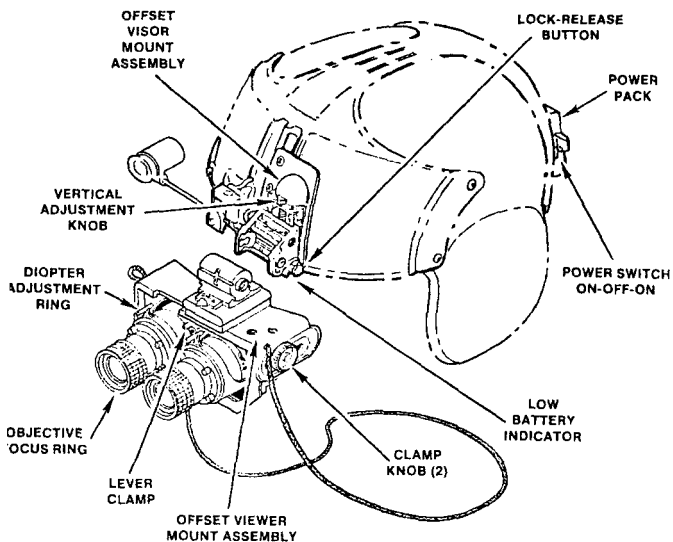


Figure 2-1. Controls and Indicators, GM-6(V)2, shown with AN/PVS-5C Binocular Assembly (GM-6(V)1 is similar)

Table 2-1. Operator's Controls and Indicators

CONTROLS & INDICATORS	FUNCTIONS
DIOPTER ADJUSTMENT RING	Focuses eyepiece lens, adjusts for clearest image. Range of adjustment is +2 to -4 diopters (1/4 turn).
CLAMP KNOB	Locks binocular position in viewer mount assembly or offset viewer mount assembly. Allows adjustment of the binocular assembly until the eyepieces are located at a comfortable distance from your eyes with proper tilt. Loosen clamp knobs to allow storage in carrying case.
GM-6(V)1 VISOR MOUNT ASSEMBLY OR GM-6(V)2 OFFSET VISOR MOUNT ASSEMBLY	Attaches to the helmet mechanically. A red dot is on the electrical connector that matches up to a red dot on the power pack electrical connector to complete the electrical connection.
GM-6(V)1 VIEWER MOUNT ASSEMBLY or GM-6(V)2 OFFSET VIEWER MOUNT ASSEMBLY	Houses the binocular assembly and attaches to the visor mount or offset visor mount assembly on the SPH-4 helmet.
IMAGE INTENSIFIER	When power is on, the image intensifier glow green as seen through the eyepieces.

Table 2-1. Operator's Controls and Indicators (Continued).

CONTROLS & INDICATORS	FUNCTIONS
LEVER CLAMP (Wing Nut)	Allows for adjustment of monoculars for proper distance between the pupils of your eyes.
LOCK-RELEASE BUTTON	The lock-release button allows the binocular to be put in the stowed up or down position.
LOW-BATTERY INDICATOR	When illuminated, it indicates a low battery condition with approximately 30 minutes of battery life remaining.
OBJECTIVE FOCUS KNOB	Allows one to focus by turning the objective lens knob counterclockwise to infinity focus (approximately 1/2 turn between a near to a far focus setting). Also known as the battery pack, provides power to the goggles.
POWER SWITCH	Three position switch ON/OFF/ON located on the power pack.
VERTICAL ADJUSTMENT KNOB	Moves the binocular up and down in a vertical direction. Turn the knob to center the eyepieces in front of the eyes.

Section II. Operators Checks

2-2 OPERATOR'S CHECKS TABLE FOR GM-6(V)1 and GM-6(V)2 NVG.

a. General. Table 2-2 for Aviation use is provided so you can keep your equipment in good operating condition and ready for its primary mission.

b. Warnings and Cautions. Always observe the warnings and cautions appearing in the table. Warnings and cautions appear before applicable procedures. You must observe the warnings to prevent serious injury to yourself and others, and the cautions to prevent your equipment from being damaged.

c. Explanation of Table Entries.

(1) Step Number Column. Step numbers are included to assist you in performing the checks.

(2) Location, Item to Check Column. This column provides the location and the item to be checked.

(3) Procedure Column. This column gives the procedure you must do to check or service the item listed in the Check/Service column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.

(4) Not Usable If: Column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make

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checks that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

d. Other Table Entries. Be sure to observe all special information, cautions, and notes that appear in your table.

NOTE

If goggles fail to operate follow the troubleshooting procedures in Chapter 4, Section II. Report any deficiencies in accordance with DA Pam 738-751.

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG.

	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
BEFORE	OPERATION CHECKS		
1	Maintenance forms and records	<p>Open carrying case, inventory items and check the DA Form 2408-30 and log-book</p> <p>* 90 days PMCS</p> <p>* 180 day service</p> <p>* Distortion test on each tube completed</p> <p>* Grounding condition present</p>	<p>Not current</p> <p>Not current</p> <p>Not completed</p> <p>Not corrected</p>
2	Power pack case	<p>Inspect case for damage or missing components.</p> <p>NOTE</p> <p>If the aircraft power connector cap is missing, the power pack is still operable and it does not affect is function.</p>	Case cracked

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

	ITEM TO CHECK		
3	Power pack power cable	Inspect cable for damage, connector for bent pins, quick release for proper operation, protective shield frayed or broken .	Cable damaged. Connector inoperative
4	Battery compartment	Check for corrosion, damaged contacts, spring tension caps damaged, or battery cap tether cable frayed or broken.	Contacts corroded or damaged or cable broken
5	Velcro to hold power pack.	Make sure velcro is free of lint and securely attached.	Velcro won't hold power pack on helmet
6	Visor mount assembly or offset visor mount as-	Inspect visor mount assembly or offset visor mount assembly for cracks or excessively worn mounting holes. Check for loose or frayed wires. Check that mount assembly is attached to the helmet.	Cracked visor mount or offset visor assembly Detached or frayed wires. Not secured.

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

STEP	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
7	Viewer mount assembly or offset viewer mount assembly	<p>Inspect dual contacts and springed balls for dirt and wear. If dirty, clean with a pencil eraser.</p> <p>Inspect the viewer mount or offset mount assembly to make sure it securely attaches to the visor mount or offset visor mount assembly, vertical adjustment operates, and lock-release button operates.</p>	<p>Springed balls inoperative or contacts missing</p> <p>Side cracked, vertical adjustment inoperable, release button inoperative, or missing.</p>

DUAL CONTACTS

The diagram consists of two line drawings. The left drawing shows a close-up of a viewer mount assembly with two small circular contacts. The right drawing shows an offset viewer mount assembly with two similar contacts. A central label 'DUAL CONTACTS' has two lines pointing to these contact points on both assemblies.

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

STEP	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
8	Power cable of the visor mount or offset viewer mount assembly	Inspect to make sure cable is free of visible damage, female connectors are free of debris and red dot on connector is visible, and connector securely attached to visor mount or offset visor mount assembly.	Cable or connectors damaged
9	Visor Link (GM-6(V)1)	Check to make sure the visor link is present and not cracked. NOTE Place neck cord around neck.	Link cracked or missing
10	Neck Cord	Inspect neck cord for security, breaks, frayed, or missing.	Not secured, excessively frayed, or missing.
11	Objective lenses	Inspect lenses for cleanliness, scratches, chips, or cracks. If necessary clean with lens paper. Objective lenses must be of the same type (Matched pairs - both AN/PVS-5A, or -5B or -5C)	Cracked, chipped, or broken Objective lenses are not matched pairs

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

STEP	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
12	Objective lens focus knobs	Rotate knobs and check for free movement, approximately, 1/3 turn.	Focus knobs bind or fails to rotate 1/3 turn
13	Clamp knobs	Check to see if binocular assembly moves freely, can be secured and lock nuts are present and secure.	Binocular assembly doesn't adjust or lock securely.
14	Lever clamp (Wing nut)	Check to see if monoculars move freely for pupillary adjustment when the lever clamp (wing nut) is loosened but do not move when the wing nut is tightened.	Monoculars do not move when the lever clamp (wing nut) is loosened. Monoculars are moveable when the lever clamp is tight. Lever clamp is missing.
15	Eyepiece lenses	Inspect lenses for cleanliness, scratches, chips, or cracks. If necessary clean with lens paper.	Cracked, chipped, or broken.
16	Diopter adjustment rings	Rotate diopter adjustment rings to see that they move freely, approximately 1/4 turn.	Diopter adjustment rings bind

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

STEP	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
17	Bottom of frame	Sight along long axis to check for bent metal frame indicating monoculars are not aligned parallel. (See fig. 2-13).	Bent frame
18	Sacrificial Filter Caps	Inspect for scratches, chips, or other damage.	Damaged or missing.
19	Demisting Shields	Inspect for dirt, dust, fingerprints, scratches, chips or other damage.	Damaged or missing.
20	Low-battery indicator	Attach power pack to visor guard power cable. Install good batteries in each compartment, place switch in either ON position (only AA battery power pack) and remove battery cap, breaking electrical contact. The low-battery indicator should come on or blink. Check the other side.	Low-battery Indicator will not illuminate or blink

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

STEP	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
21	Viewer mount as- sembly or offset viewer mount as- sembly	<p style="text-align: center;"><u>CAUTION</u></p> <p>Operate NVG under nighttime conditions or in a dark room.</p> <p>Install viewer mount or offset viewer mount assembly in the visor mount or offset mount assem- bly locked in the down position. Make sure the power switch is turned off. Hold the binocular with eyepieces fac- ing you at approxi- mately a 30-degree angle and slide the spring-loaded ball bearings of the binocular's viewer mount into the chan- nels of the visor mount until they lock in place. Make sure the fit is secure and snug.</p>	Not held se- curely in the down position.

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

STEP	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
		<p>Press the lock-release button (fig. 2-15) and rotate the binocular to the up (stowed) position. Make sure it engages properly.</p> <p>Check the vertical adjustment for proper operation.</p>	<p>Binocular will not stay locked in up (stowed) position</p> <p>Movement binds or does not adjust.</p>
<u>DURING OPERATIONAL CHECKS</u>			
22	Power pack ON/OFF/ON switch	Place switch in ON position and observe green glow in both eyepieces. Check other ON position.	Green glow absent in one or both eyepieces
23	Image viewed	Check for bright spots, edge glow, shading, excessive fixed-pattern noise (honeycomb), flickering, or excessive black spots (refer to para 2-4 Inspection Criteria for Proper Image Intensifier Operation).	Presence of any one or more faults that fail inspection criteria

Table 2-2. Operator's Checks for GM-6(V)1 and GM-6(V)2 NVG (Continued).

STEP	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USABLE IF:
AFTER	OPERATION	<p style="text-align: center;">NOTE</p> <p>Operator may use the TS-4348/UV to assist in checking the viewed image (refer to para 2-3).</p> <p style="text-align: center;">CHECK</p>	
25	Power Pack	<p>Place the switch in the OFF position, remove the batteries, inspect battery compartment for corrosion or leaking batteries, and stow the power pack in the carrying case so the power cable faces up.</p>	

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2-3 OPTIONAL CHECK USING THE TS-4348/UV TEST SET

a. Setup. Before using the TS-4348/UV Test Set, refer to TM 11-5855-299-12 to familiarize yourself with its operation and the warnings and cautions associated with that test equipment.

The following procedures are designed to check the performance of the image intensifier in each monocular.

b. Low-Light and High-Light Resolution Test. Test the binocular for low-light and high-light resolution performance according to the following steps:

NOTE

- This test must be performed in a darkened area. Your eyes must be dark-adapted to perform this test.
- Review the following test procedure before entering the darkened area.
- You will need a flashlight with a blue/green filter to read this procedure while in the darkened area.
- Expect cosmetic blemishes, such as chicken wire, black spots, and fixed pattern noise to stand out while viewing through the TS-4348/UV. This is acceptable when it is on the high-light level.

(1) Place the HIGH/LOW switch on the test set to the LOW position.

(2) Turn off the room lights and let your eyes adjust to the dark for approximately 10 minutes.

(3) Turn on the test set by setting the "II/III" switch to the "II" position.

(4) Turn on the binocular by flipping the power pack's ON/OFF/ON switch to the appropriate position.

(5) Look through the appropriate monocular and view the projected pattern (fig. 2-2). When using the TS-4348/UV, use the same focusing procedures described in paragraph 2-6c to obtain the best focus.

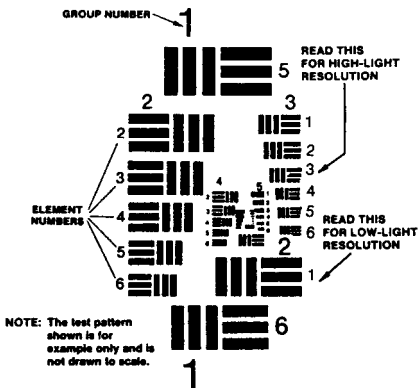


Figure 2-2. TS-4348/UV Test Set Pattern.

(6) Determine the group number and element of the smallest pattern resolvable.

NOTE

For a pattern to be resolvable, three vertical bars and three horizontal bars must be visible.

(7) The NVG must be able to resolve Group 2. Element 1 under low-light conditions to pass the test. If the monocular does not pass the test, send the NVG to maintainer for repair.

(8) Repeat steps (5) through (7) for the other monocular.

(9) Flip the HIGH/LOW switch to the HIGH position.

(10) Again, look through the monocular and view the projected pattern (fig. 2-2). If necessary, focus the objective lens and then the eyepiece of the monocular to obtain the sharpest image.

(11) Determine the group number and element of the smallest pattern resolvable.

NOTE

For a pattern to be resolvable, three vertical bars and three horizontal bars must be visible.

(12) The NVG must be able to resolve Group 3, Element 3 under high-light conditions to pass the test. If the monocular does not pass the test, send the NVG to maintainer.

(13) Look for flashing, flickering, or other nonstable behavior of the image intensifier. If any unacceptable conditions are noted, send the NVG to the maintainer.

(14) Repeat steps (10) through (13) for the other monocular.

2-4 INSPECTION CRITERIA FOR PROPER IMAGE INTENSIFIER OPERATION

As directed in Table 2-2, image intensifier operation must be checked before each flight. This section provides information for the operator concerning what to look for, how to look for it, and how to determine if the NVG should be returned to the maintainer. All non flyable conditions should be recorded on the appropriate maintenance forms so the maintainer can take corrective action. While formal determination of a defective image intensifier is made by maintenance personnel, the operator is the person ultimately responsible for determining whether the image intensifier operation interferes with his ability to perform his mission. If maintenance personnel determine that the image intensifier performance meets the specification and the operator still finds the performance interferes with his ability to perform the mission, he must record the problem on the appropriate maintenance forms and return the NVG to maintainer.

WARNING

Toxic Material

The image intensifier phosphor screen in each monocular assembly contains toxic materials.

- A broken image intensifier maybe caused from damage to the binocular assembly, especially if the monocular housing is cracked by force.
- If the phosphor screen material contacts your skin, wash it off immediately with soap and water and seek medical attention as soon as possible.
- If you inhale/swallow any phosphor screen material, drink a lot of water, induce vomiting, and seek medical attention as soon as possible.

NOTE

Perform the following inspection in the dark.

To perform this inspection, attach the binocular and power pack to the helmet visor as described in paragraph 2-5 and turn the ON/OFF/ON switch to the primary ON position. Do not use the alternate compartment with the fresh (no-time) back-up battery. Look through the binoculars by viewing one monocular at a time.

a. Shading. Each monocular should present a perfect circle. If shading is present, you will not see a fully circular image (fig. 2-3). Shading always begins on the edge and moves inward. Do not use if shading is present. Return the NVG to the maintainer.

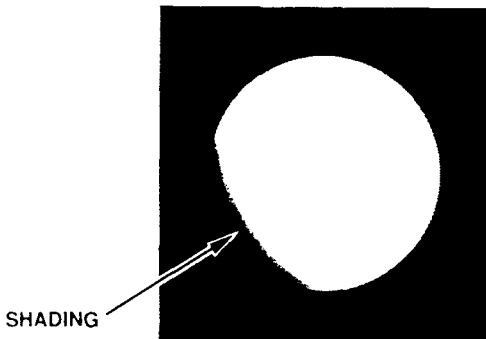


Figure 2-3. Shading.

NOTE

Make sure the shading is not the result of improper tilt, eye-span adjustment, or vertical adjustment (refer to para 2-6a).

b. Edge Glow. Edge glow is a bright area (sometimes sparkling) in the outer portion of the viewing area (fig. 2-4). To check for edge glow the operator can block out all light by cupping a hand over the lens. If the image tube is displaying edge glow the bright area will still show up. Do not if edge glow is present. Return to the maintainer.

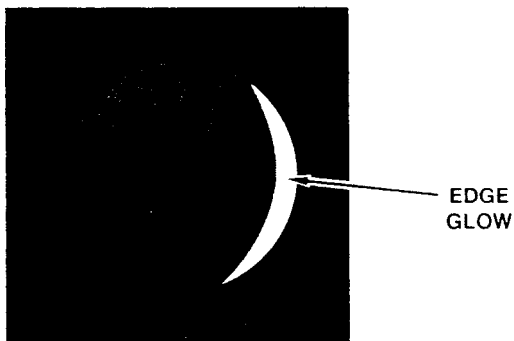


Figure 2-4. Edge Glow.

c. Bright Spots. These can be defects in the image area caused by a flaw in the phosphor screen. A bright spot is a small, nonuniform, bright area that may flicker or appear constant (fig. 2-5). Not all bright spots make the NVG rejectable. Cup your hand over the lens to block out all light. If the bright spot remains, it is an emission point. Bright spots usually go away when the light is blocked out, if they are cosmetic defects. Bright spots are acceptable if they do not interfere with the ability to perform the mission. If bright spots do interfere turn the goggles into maintenance for evaluation.

NOTE

Make sure any bright spots or emission points are not simply a bright area or point light source in the scene you are viewing.

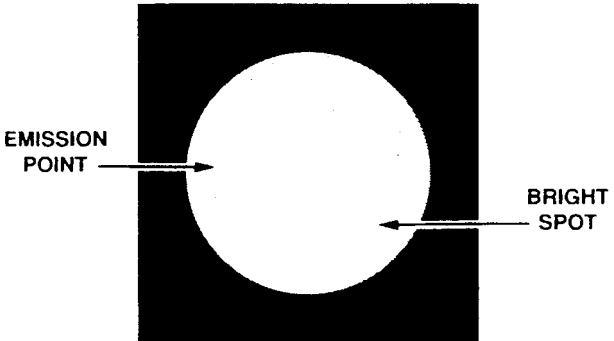


Figure 2-5. Bright Spots.

d. Emission Points. A steady or fluctuating pinpoint of bright light in the image area that does not go away when all light is blocked from the objective lens of the monocular. This may be surrounded by a halo effect. The position of an emission point within the image area does not move. Not all emission points make the NVG rejectable. Emission points are unacceptable if they are brighter than the background scintillations, in which case, return the NVG to the maintainer.

e. Flashing, Flickering, or Intermittent Operation. The image may appear to flicker or flash. This can occur in either one or both monocular. If there is more than one flicker, check for loose wires, loose battery cap, or weak batteries. Do not use if this condition exists. If the problem cannot be corrected, return the NVG to the maintainer.

f. Black Spots. These are cosmetic blemishes in the image area. Black spots are acceptable as long as they do not interfere with viewing the image. No action is required if this condition is present unless the spots interfere with the ability to perform the mission.

g. Fixed-Pattern Noise (Honeycomb). This is usually a blemish characterized by a faint hexagonal pattern throughout the viewing area that most often occurs at high-light levels or when viewing very bright lights (fig. 2-6). This pattern can be seen in every image intensifier if the light level is high enough. This condition is acceptable as long as the pattern does not distract from viewing the image and interferes with the ability to perform the mission or if it still remains when viewing in low-light conditions, in which case, return the NVG to the maintainer for evaluation.

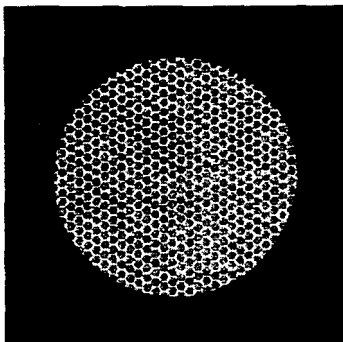


Figure 2-6. Fixed-Pattern Noise (Honeycomb).

h. Chicken wire. An irregular pattern of dark thin lines in the field of view either throughout the image area or in parts of the image area (fig. 2-7). Under the worse case condition, these lines will form hexagonal or square-wave shaped lines. No action is required if this condition is present unless the chicken wire interferes with viewing the image and interferes with the ability to perform the mission. In that case, return the NVG to the maintainer.

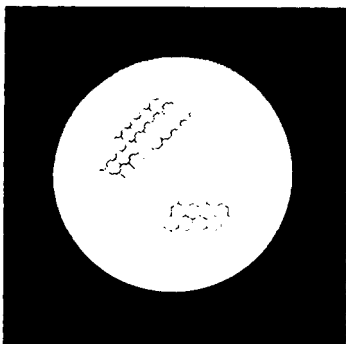


Figure 2-7. Chicken Wire.

i. Image Disparity. This condition exists when there is a difference in performance between the two image intensifiers within the same binocular. This is usually noted by one image appearing brighter than the other. This condition is acceptable unless the difference is significant enough to interfere with the operator's ability to perform the mission.

j. Image distortion. This problem is more easily detected in high-light conditions. It is evidenced by vertical objects, such as trees or poles appearing to wave or bend when your head (with NVG) is moved vertically or horizontally. Ground surfaces in the direction of hover may appear to swell or sink. Distortion does not change during the life of an image intensifier. Each image intensifier has been screened for distortion before the first use; therefore, no action is required if this condition is present unless it interferes with viewing the image and interferes with the operator's ability to perform the mission. In that case, return the NVG to the maintainer.

Section III. Operation Under Usual Conditions.

2-5 ASSEMBLY AND PREPARATION FOR USE

WARNING

Do not operate the goggles until you have read and have understood all operation instructions.

CAUTION

- This equipment is a precision electro-optical instrument and must be handled carefully. Keep caps on objective and eyepiece lens when not in use.
- Do not expose the unprotected objective lens to bright light with power applied to goggles.

a. Installing or Replacing the Helmet Visor Mount or Offset Visor Mount Assembly. Installing or replacing the NVG helmet visor mount assembly is performed by maintenance personnel. This is not an operator task.

b. Counterweight System. The counterweight system consists of two elements the weight bag and the counterweights. The weight bag is locally constructed and is the responsibility of the maintainer.

(1) Counterweights. Some things that should be considered when choosing materials to use as counterweights are as follows:

(a) Multiple weights, such as buckshot in ziplock pouches, are ideal for this purpose because the amount of weight can be easily adjusted for different helmet/NVG system configurations. This type of weight allows the weight bag to conform more easily to the contour of the helmet, providing a larger area of attachment and increasing retention. The chances that the weight bag will become a missile hazard if it is dislodged during a crash are also lessened by using buckshot in the weight bag. Ensure weights are secure to prevent spilling them in the aircraft.

(b) Tire weights, which are commonly used as counterweights have sharp edges that reduce the life of the weight bag. They can also become missile hazards.

(2) Amount of Counterweight. The amount of counterweight needed will vary among individuals and NVG systems. Individuals should add or remove weights as needed to

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achieve the best balance and comfort, but the attached bag should never weigh more than 22 ounces.

(a) Place the microphone against your lips.

(b) Tilt your head down about 45° and rotate your head from side to side. If you feel the microphone moving (on your lips) in the opposite direction of head movement, you need a counterweight to stabilize the goggles.

(c) Add counterweight material. Add just enough weight to prevent movement of the microphone on the lips.

(d) Check up and down movement of the head. With excessive weight, rotation of the helmet on the head is exaggerated.

(3) Counterweight Variables. Many variables affect the amount of weight needed to counterbalance the goggles. Variables that have a minor effect include helmet size, head shape, and helmet suspension type. The following factors have a major effect on the amount of counterweight required:

(a) Position of the binocular. The farther away from the eyes that the binocular is positioned, the more counterweight is required.

(b) Mounting the weight bag high on the Velcro strip on the back of the helmet increases the amount of counterweight required. To keep the amount of head supported weight to a minimum, the weight bag should be attached low on the back of the helmet. It is preferable to mount the battery pack vertically above the weight bag.

(c) The flip-up feature of the GM-6(V)1 and GM-6(V)2 mount shifts the center of gravity of the binocular forward and upward away from the head/helmet center of gravity.

c. Neck Cord Installation. To install the neck cord, use the following procedures:

CAUTION

To prevent damage, destruction, or loss of the goggles, the neck cord must be worn while flying.

(1) Locate the neck cord.

(2) Tie a knot in one end of the neck cord. From the bottom side of the mount, insert the other end of the neck cord through one of the holes on the outside of the mount and then down through the other hole in the other side of the mount (fig. 2-8). Now, tie a knot in the free end of the neck cord on the underside of the mount.

NOTE

Make sure the knots on the neck cord are on the underside of the mount. If the neck cord is installed with the knots tied on the upper side, the knots can interfere with the flip-up function.

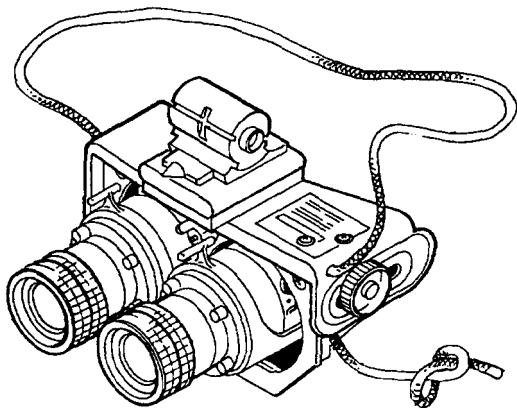


Figure 2-8. Installing the Neck Cord (GM-6(V)1 shown).

d. Battery and Power Pack Installation.

WARNING

Do not use mercury or rechargeable NiCad batteries. Using these batteries could result in a system failure.

WARNING

Danger of Explosion

Do not transport batteries in pockets, or other containers, containing metal objects such as coins, keys, etc. Metal objects can short circuit batteries and cause them to become very hot. The BA-5567/U lithium batteries could explode.

WARNING

The BA-5567/U lithium battery contains sulphur dioxide gas under pressure and should be handled in the following manner. If you inhale sulphur dioxide, seek medical attention immediately.

- Do not heat, puncture, disassemble, short circuit, attempt to recharge, or otherwise tamper with the batteries.
- Turn off the equipment if the battery compartment becomes unduly hot. Do not open the battery compartment, but turn in the goggles to the maintainer and report the problem.

WARNING CONTINUED

- Ž The batteries have safety vents to prevent explosion. When they are venting gas, you may smell it (very irritating, rotten egg odor) or hear the sound of gas escaping. When the safety vents have operated, the batteries are fairly safe from bursting, but still must be handled with care.

If you inhale sulphur dioxide, seek medical attention.

FIRST AID

For first aid or artificial respiration, see FM 21-11, First Aid for Soldiers.

WARNING

When using the power pack without AA battery capability, make sure the batteries are not expired. If a dead battery is in the compartment opposite the one being used to power the goggles, the low-battery indicator will not come on when the voltage of the active battery drops to 2.4 vdc and may result in a system failure.

CAUTION

Be sure the power pack is switched off before installing the batteries.

Install either two BA-5567/U lithium batteries or four BA-3058/U alkaline batteries, or a combination of one BA-5567/U lithium battery and two BA-3058/U AA alkaline batteries as follows. You may mix both types of batteries in the power pack.

(1) Remove the battery caps by pushing them in and turning counterclockwise.

(2) Check to make sure the contacts in the battery caps are clean.

WARNING

If using BA-5667/U lithium batteries, inspect the batteries for damage or defects before using them. Also inspect the sealed plastic bag around new batteries for signs of leakage, do not return them to the local supply point. Dispose of the batteries according to the unit Standard Operating Procedure.

NOTE

The primary battery compartment is the upper compartment with respect to the ON/OFF/ON label. The alternate compartment is the lower compartment with respect to the ON/OFF/ON label.

(3) Notice the required polarity for each type of battery as illustrated on the outside of the power pack. If you are using AA alkaline batteries, install two batteries in a battery cartridge so the “-” (flat) end is against the spring and the “+” (nipple) end is against the flat contact. Insert either two loaded AA battery cartridges (contact-end first), two BA-5567/U lithium batteries, or a combination of one loaded BA-3058/U AA alkaline battery cartridge and one BA-5567/U lithium battery according to the illustration on the power pack in figure 2-9.

NOTE

Use fresh (No Time) batteries in the alternate (lower) compartment before beginning a mission.

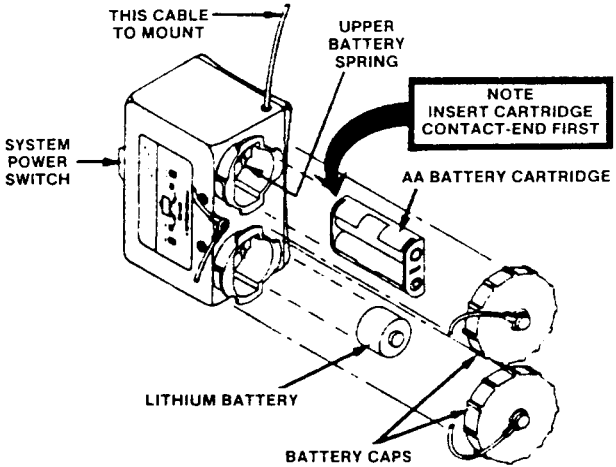
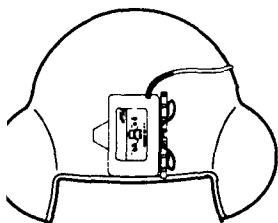


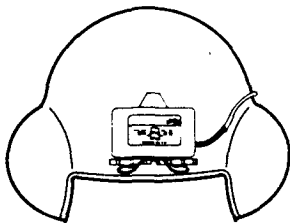
Figure 2-9. Power Pack Installation.

(4) Replace the battery caps by pushing them in and turning clockwise.

(5) The primary power pack position is to mount the switch on the left side. To mount the power pack in the primary (vertical) position, place the ON/OFF/ON switch on the left side of the helmet, press the Velcro side of the power pack onto the Velcro fastener on the back of the helmet (fig. 2-10). In the event of a battery failure flip the ON/OFF/ON switch to a new position (fresh (no time) battery). The power pack has an approved, alternative position (horizontal) which mounts the power pack with the ON/OFF/ON switch facing up (fig. 2-10).



VERTICAL (PRIMARY)



HORIZONTAL (ALTERNATE)

Figure 2-10. Power Pack Positions.

NOTE

Before connecting the two power cables, make sure the switch on the power pack is in the OFF (center) position.

(6) The power connector is quick release. To connect the two cables, align the red dots and press the male connector (from the power pack) into the female connector on the edge of the visor shield until the two halves click.

e. Low-Battery Indicator Check. At the base of the goggles mount is a red light emitting diode (LED) that comes on or blinks at a steady rate when battery voltage is low (fig. 2-11). To make sure this indicator works, perform the following check.

WARNING

If eyeglasses are worn, the upper rims of the eyeglasses can obscure the low-battery indicator.

(1) With good batteries installed in both compartments of the power pack, take off the battery cap to the alternate (lower) compartment.

(2) Turn the power switch to the alternate ON position (the compartment with the cap removed). The low-battery indicator should come on or blink.

(3) Return the switch to the OFF (middle) position and put the battery cap back on.

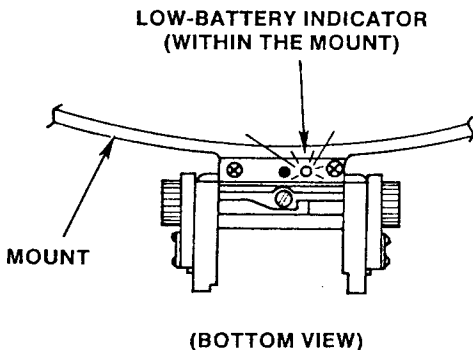


Figure 2-11. Low-Battery Indicator.

(4) Take off the battery cap to the primary (upper) compartment.

(5) Turn the power switch to the primary ON position (the compartment with the cap removed). The low-battery indicator should come on or blink.

(6) If the low-battery indicator does not come on, replace the batteries with fresh ones and try again. Make sure the power cable is properly connected. If the indicator still does not function, return the power pack, helmet and viewer mount (or offset viewer mount) to the maintainer for fault isolation.

f. Attaching the Viewer Mount or Offset Viewer Mount to the Visor Mount or Offset Visor Mount.

CAUTION

Do not expose the unprotected objective lenses to bright light with power applied to the goggles.

NOTE

To mount and adjust the GM-6(V)2 version, make sure the helmet sight extension rod is fully extended and placed in the UP (non-operating) position. The sight cannot be used with the binocular in the operating position. The binocular must be removed or stowed in the UP position to use the helmet sight.

- (1) Make sure the power switch is turned OFF.
- (2) Neck cord is placed around the neck before helmet is placed on head.
- (3) Hold the binocular with both hands at approximately a 30-degree angle so the eyepieces face you and slide the spring-loaded ball bearings of the viewer mount or offset mount assembly into the channels of the mounts until they lock in place.
- (4) Press the lock-release button (fig. 2-12) and rotate the binocular to the up and locked position. Ensure it locks in place.
- (5) Press the lock-release button and ensure it locks down properly. In the down position, the goggles can be moved up without using the lock release in an emergency.

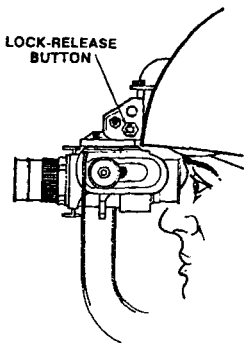


Figure 2-12. Lock-Release Button.

2-6 OPERATING PROCEDURES.

WARNING

If eyeglasses are worn, the upper rims of the eyeglasses can obscure the low-battery indicator.

NOTE

To assist in setting the controls and adjustments, you may want to have your interpupillary distance measured by authorized medical personnel. This measurement will enable optimal adjustment of the eyespan distance.

a. Setting the Controls and Adjustment. The GM-6(V)1 and GM-6(V)2 is designed to adjust for differences in head shape and corrects for most differences in eyesight. The controls and adjustments for the GM-6(V)1 and GM-6(V)2 are the same. Familiarize yourself with the illustrated components of the goggles. (fig. 2-13).

NOTE

Although these NVG are designed to be used without eyeglasses, if eyeglasses are needed to read the aircraft instruments and the eyeglass lenses will fit within the eye-relief distance of the eyepiece, eyeglasses can and should be worn.

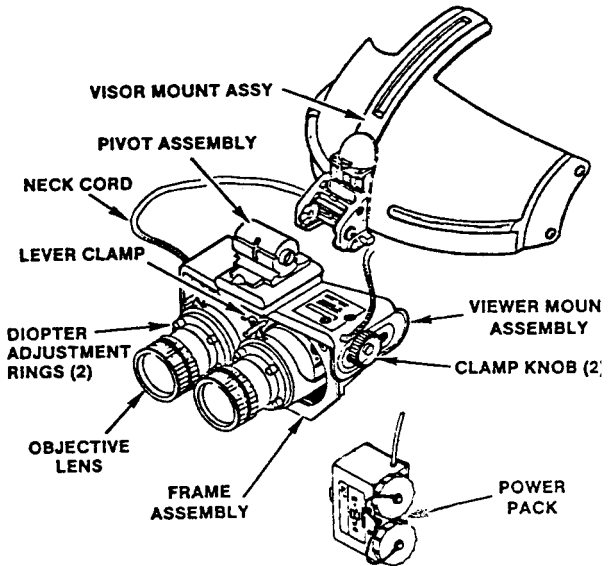


Figure 2-13. Components of NVG, GM-6(V)1 shown with AN/PVS-5C Binocular Assembly, (GM-6(V)2 is similar).

NOTE

Before using the NVG for flight operations, be sure to check out the system's operation. Use the following operating procedures when performing the Troubleshooting in Chapter 4, Section II. If any problem persists, return the system to the maintainer.

(1) Make sure the batteries are installed as described in paragraph 2-5d. Remove the lens caps.

(2) Turn the power switch initially to the primary (upper) ON position. A green glow will appear in each eyepiece (after a slight delay). Begin the mission with the power switch in the primary ON position because in the event of a failure, it is easier and more natural to flip the switch down than up.

NOTE

If a red light appears at the base of the NVG mount, the batteries in that compartment are low and need to be replaced. Switch to the other battery compartment and make sure those batteries are good.

NOTE

Use fresh (No Time) batteries in the alternate (lower) compartment before beginning a mission.

(3) Turn the vertical adjustment knob (fig. 2-14) to center the eyepieces in front of your eyes. Minor readjustment may be needed after adjusting the tilt.

NOTE

If the NVG eyepieces are not properly aligned with the eyes, optimal resolution will not be achieved. Proper alignment of the eyepieces is achieved when the distance between the monocular matches the distance between your pupils and the line of sight is the same as the vertical angle of the NVG. When all the eyepiece adjustments (eye span, vertical, and tilt) are properly set, the edges of the images in both monocular will be clear.

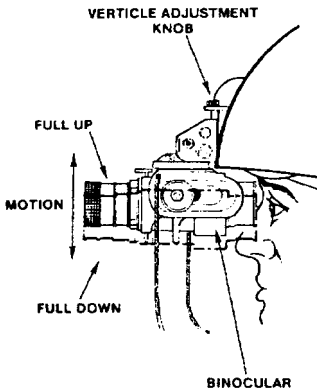


Figure 2-14. Vertical Adjustment Knob.

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(4) To adjust eyespan, loosen the lever clamp (wing nut) clockwise to the right and gently pull the monocular outward to the fullest extent. Then, gently push the monoculars together to attain a proper sight picture.

(a) By closing one eye at a time, alternately observe the clarity of the edges of the circles with each eye. If the outside edges are blurred, the monocular are too close together. If the inside edges are blurred, the monocular are too far apart. If the upper or lower edges are again blurred, tilt and/or vertical adjustment may need to be made. When properly adjusted, the edges of the images in both monoculars will be clear as two circles, overlapped and slightly displaced laterally.

(b) Tighten the lever clamp (wing nut) clockwise, finger tight. Do not over tighten the lever clamp.

(5) Clamp knob adjustment.

(a) Tilt. Loosen the clamp knobs counterclockwise and adjust the monocular to attain the desired monocular tube tilt. The monocular have a tilt range of 25 degrees, far more than necessary. Tilting the monocular too far downward will cause the illusion of hovering too high, your reaction will be to hover too low. Tilting the tubes too far upward will cause the illusion of hovering too low, and your reaction will be to hover too high.

(b) Eye relief. The monocular may be adjusted fore and aft in the slot of the viewer mount or offset viewer mount assembly within a 0.39 inches (10mm) range. Start by placing the monocular as close to the eye as possible and then move them outward. The position is a matter of individual preference. Army policy is to optimize field of view (FOV). Crew members may tilt their heads to achieve better look-under capability. Placing the monocular close to the eye will allow an excellent view of the monocular image, but will decrease your peripheral view. Placing the monocular out to the full extent will improve your peripheral vision, yet produce a smaller monocular profile. If the monocular lenses are more than 0.71 inches (18 mm) from the eye, the FOV will be less than 40 degrees.

NOTE

If the eyepiece lenses are not properly aligned with the eyes, optimal resolution will not be achieved. Proper alignment of the eyepiece lenses is achieved when the distance between the monocular matches the distance between your pupils and the line of sight is the same as the vertical angle of the binoculars. When all the eyepiece adjustments (eyespan, vertical, and tilt) are properly set, the edges of the images in both monocular will be clear.

(c) Tighten the clamp knobs clockwise, finger tight. Do not overtighten the knobs.

- b. Flip-Up/Flip-Down Procedure.

CAUTION

Do not attempt to flip-up or flip-down the binocular without using the lock-release button. The binocular could be damaged or may come out of the mount if the lock-release button is not used.

NOTE

For the GM-6(V)2, the helmet offset visor mount assembly extension rod must be fully extended and in the UP position to operate the flip-up/flip-down feature.

NOTE

The flip-up position can be used when you do not need to use the binocular for short periods of time.

(1) Grasp the binocular with your left hand.

(2) With the index finger of your left hand, press in the lock-release button (fig. 2-15).

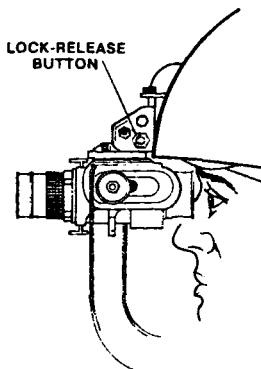


Figure 2-15. Lock-Release Button.

(3) Smoothly, but firmly, rotate the binocular upward toward the top of the helmet until it stops.

(4) Release the lock-release button. Make sure the binocular is locked in the up (stowed) position before releasing your hold on the binocular.

(5) To flip the binocular back to the operating position, grasp the binocular with your left hand.

(6) With the thumb of your left hand, press in the lock-release button (fig. 2-15).

(7) Smoothly, but firmly, rotate the binocular downward until it stops.

(8) Release the lock-release button. Make sure the binocular locks into the operating position.

c. Indoor Focusing Procedure. Over accommodation and/or focus imbalance between the eyes can cause eye strain and periodic blurred vision. To achieve a clear and relaxed binocular focus, use the following sequence:

NOTE

- When setting the diopter adjustment, it is possible to achieve a clear image in each eye (monocular) and yet have a blurred image or develop eyestrain when viewing with both eyes (binocular).
- Perform the binocular focusing procedures in a dark area, but with sufficient light so the goggles operate without appreciable visual noise (scintillations).
- Perform this procedure only after properly adjusting your helmet weight bag.

(1) Preset the objective focus knob and diopter adjustment ring of both monocular fully counterclockwise (fig. 1-14).

(2) Cover your left eye or cup your hand over the left objective lens. Do not close your left eye. Be careful not to touch the lenses.

(3) Look at a target to focus on that is 20-feet away (a vision chart or other object that has lettering or fine detail). If a 20-foot distance is not available, use the maximum distance possible.

(4) Turn the right diopter adjustment ring clockwise until you first obtain a clear image, and stop.

NOTE

If you continue to turn the knob clockwise, the image may seem clear initially, but you could experience eye strain or headaches after prolonged use.

(5) Now, view through the right monocular with the right eye and turn the right objective focus knob clockwise until you achieve the clearest vision (fine detail).

(6) Repeat steps (2) through (5) above for the left monocular.

(7) After adjusting both monocular for best focus, cover the objective lens of the left monocular and view the right monocular checking to see if the image is still clear. Then cover the right monocular with the right hand and view the image through the left monocular. If either monocular is not clear, repeat steps (2) through (5).

(8) With both eyes open, make final objective focus adjustments. If necessary, make minor adjustments.

(9) Turn off the goggles.

(10) Use steps (2), (3), (4), (6), and (9) of the following outdoor focus adjustment procedure to accomplish final adjustment of the objective focus for each monocular, especially if the procedure followed above used a focusing target less than 20-feet away.

d. Outdoor Focusing Procedure. Over accommodation and/or focus imbalance between the eyes can cause eyestrain and periodic blurred vision. To achieve a clear and relaxed binocular focus, use the following procedure to accomplish focus adjustments when there are no indoor facilities or to accomplish fine objective focus adjustments when the indoor procedure is used.

NOTE

- When setting the diopter adjustment ring, it is possible to achieve a clear image in each eye (monocular) and yet have a blurred image or develop eyestrain when viewing with both eyes (binocular).
- The following procedure is performed outdoors at night wearing the goggles.

(1) Preset objective focus knob and diopter adjustment ring of both monocular fully counterclockwise.

(2) Turn on the NVG.

(3) Look at the edge or some detail of a building or other manmade structure about at least 100 to 200 feet away.

(4) Cover your left eye or cup your hand over the left objective lens. Do not close your left eye. Be careful not to touch the lenses.

NOTE

If the diopter adjustment focus has been set using the indoor procedure, skip the following step.

(5) Turn the right diopter adjustment ring clockwise until you first obtain a clear image, and stop.

NOTE

If you continue to turn the diopter adjustment ring clockwise, the image may seem clear initially, but you could experience eyestrain or headaches after prolonged use.

(6) Refine the focus of the right objective lens by very slowly turning the right objective focus knob until the sharpest image is obtained.

(7) Repeat steps (3) through (6) above for the left monocular.

(8) After adjusting both monocular for best focus, cover the objective lens of the left monocular and view the right monocular checking to see if the image is still clear. Then cover the right monocular with the right hand and view the image through the left monocular. If either monocular is not clear, repeat steps (2) through (5).

(9) With both eyes open, make final objective focus adjustments, If necessary, make minor adjustments.

(10) Turn off the NVG.

2-7. PREPARATION FOR MOVEMENT

a. Goggle Shutdown and Storage in the Carrying Case.

(1) Turn the power switch to the OFF (center) position. The green glow will disappear.

CAUTION

When removing the binocular from the mount, do not grasp one of the monocular and pull it out of the mount with a twisting motion. This will damage the mount.

(2) Remove the binocular from the mounting socket by grasping the binocular with both hands, tilt the binocular up slightly out of the lock position, and pull it straight forward.

(3) Remove neck cord from around neck.

(4) Replace the lens caps on the objective lenses and eyepiece lenses.

CAUTION

Failure to loosen the clamp knobs and clamp lever before storing could result in damage to the mount and face mask.

- (5) Loosen clamp knobs and lever clamp (wing nut).

NOTE

Before returning the binocular or any component to the carrying case, make sure it and the carrying case are free of dirt, dust, and moisture.

- (6) Disconnect the power cable's quick-release connector and remove the power pack from the helmet.

- (7) Remove the battery caps and take out all batteries. Replace the battery caps and return the power pack and battery cartridges to the carrying case. Do not store the power pack with the batteries still in it.

NOTE

Make sure the equipment and accessories are stored in the appropriate locations in the carrying case and close the cover.

2-8 DEMISTING SHIELDS

CAUTION

Demisting shields will be damaged if wiped while wet or with wet lens paper.

a. Installation and Removal of Demisting Shields. To install the demisting shields follow the following procedures (fig. 2-16).

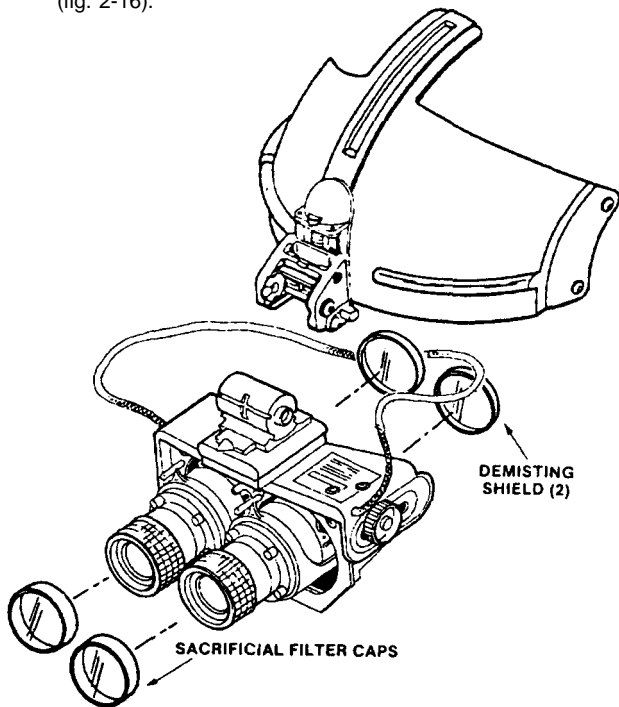


Figure 2-16. Demisting Shield and Sacrificial Filter Caps Installation (GM-6(V)1 with AN/PVS-5C binocular assembly shown (GM-6(V)2 is similar)).

(1) Remove demisting shields from NVG carrying case. Snap demisting shields over eyepiece lens. Be careful not to smudge eyepiece lenses or demisting shields.

(2) Remove demisting shields by grasping them and pulling them off the eyepiece lens and place in carrying case.

2-9 PLACING GOGGLES IN STANDBY USE

a. Short Periods. Place goggles in stowed position (fig. 2-17).

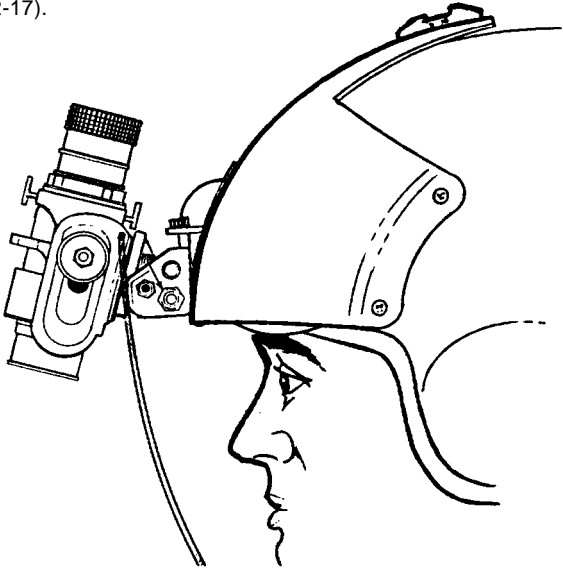


Figure 2-17. Goggles in stowed position.

b. Extended Periods.

(1) During extended periods of non use, turn off power at power pack and observe that the green glow disappears immediately from binoculars.

(2) Remove NVG from visor mount or offset visor mount assembly.

(3) Let NVG hang by neck cord around neck.

Section IV. Operation under Unusual Conditions

2-10. OPERATION IN ARCTIC CONDITIONS.

WARNING

Under arctic conditions, the cold weather mask or other covering should be worn under goggles to prevent frost bite at possible facial contact points.

a. Use lithium batteries for arctic conditions.

b. When outside temperatures are at below 0° F (-17.8°C), the demisting shields may fog up after approximately one hour's operation. When below 0° F, the proper number of demisting shields must be available to change when frosting occurs (para 2-8a for installation procedures).

NOTE

DO NOT use demisting shields if they are cracked, broken, or chipped.

2-11 OPERATION IN DUSTY OR SANDY AREAS.

Operation in dusty or sandy areas is the same as operation under normal conditions except for the following:

CAUTION

Operation in dusty or sandy areas can pit and scratch the optical elements and damage to mechanical components.

When using goggles in dusty and sandy environments, follow these procedures:

- a. Avoid pointing the goggles into the wind unless necessary for operation.
- b. Installation of sacrificial filter caps (AN/PVS-5B or -5C binocular assemblies, only). To install the sacrificial filter caps, use the following procedures:

NOTE

DO NOT use sacrificial filters if they are cracked, broken, or chipped.

- (1). Remove sacrificial filter caps from NVG carrying case. Snap them on the objective lenses. Be careful not to smudge the lenses and the sacrificial filter caps (fig. 2-16).

(2) Remove sacrificial filter caps by grasping them and pulling them off the objective lenses.

(3) Place sacrificial filter caps in the NVG carrying case.

c. Keep the carrying case closed unless removing or replacing the contents.

CAUTION

When cleaning any of the lenses, be careful not to scratch them.

d. Make sure all dust and sand is removed from the goggles and ancillary equipment, and carrying case after operation.

2-12. OPERATION IN RAINY OR HUMID CONDITIONS.

CAUTION

Operating the goggles in rainy or humid conditions can corrode, mildew, and deteriorate the system unless precautions are followed.

When using the goggles in rainy or humid environments, follow these precautions:

a. Keep the carrying case (and storage case, if applicable) closed unless removing or replacing items.

b. Dry all parts that have been exposed to high levels of moisture. Do not put any parts of the goggles away wet or store them in a wet carrying case or storage case.

c. If the eyepiece lens fog up (expect during low temperatures or in high humidity) during operation, install the demisting shields over the eyepiece lens (para 2-8a).

2-13. OPERATION IN SALT WATER AREAS.

CAUTION

Operating goggles in salt water areas can corrode and deteriorate the system unless cautions are followed.

Observe the following precautions when using the goggles in salt water areas:

a. After exposure to salt water, separate all the components and clean them with a soft cloth dampened with fresh water. Do not immerse the goggles.

b. Dry the components and ensure all electrical contacts are clean and dry. Use lens tissue to clean the optical surfaces. Do not attempt to disassemble the binoculars. Do not put the goggles away wet or store it in a wet carrying case.

CHAPTER 3 OPERATING INSTRUCTIONS FOR GROUND OPERATION

Section I. Description and Use of Operator's Controls and Indicators.

NOTE

The NVG is a precision electro-optical instrument, so handle it carefully. If the equipment fails to operate, refer to the Troubleshooting Procedures in Chapter 4, Section II.

3-1 OPERATOR'S CONTROLS AND INDICATORS

a. Controls and Indicators. The NVG is designed to adjust for differences in head shape and corrects for most differences in eyesight. Figure 3-1, 3-2, and 3-3 and Table 3-1 describe the controls and indicators.

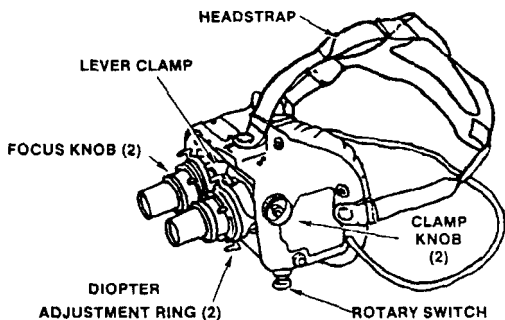


Figure 3-1. AN/PVS-5 and -5A Controls and Indicators.

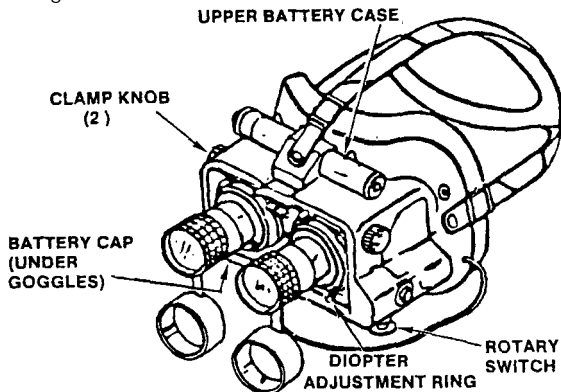


Figure 3-2. AN/PVS-5B Controls and Indicators.

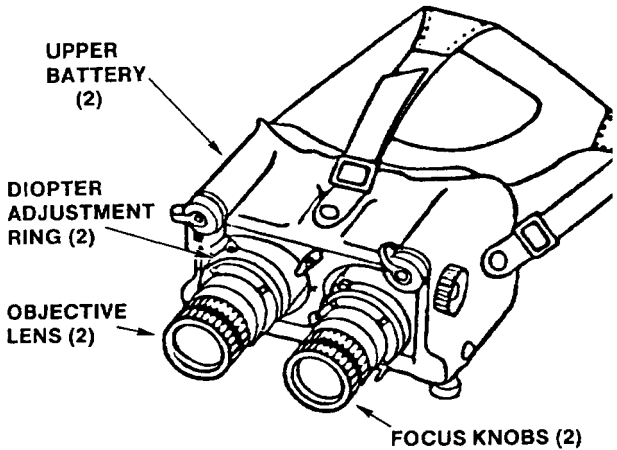


Figure 3-3. AN/PVS-5C Controls and Indicators.

Table 3-1. Operator's Controls and Indicators for AN/PVS-5, -5A, -5B, and -5C NVG.

CONTROLS AND INDICATORS	FUNCTION
BATTERY COMPARTMENTS AND CAPS	Uses two alkaline batteries (BA-3058/U) or one lithium battery (BA-5567/U). AN/PVS-5B has two battery compartments and AN/PVS-5C has three compartments. Use only one type of battery at a time.
CLAMP KNOB	Locks binocular position in face mask. Allows adjustment of the binocular assembly until the eyepieces are located at a comfortable distance from your eyes with proper tilt. Tighten both clamp knobs.
DIOPTER ADJUSTMENT RING	Focuses eyepiece lens, adjusts for the clearest image. Range of adjustment is +2 to -4 diopters (1/4 turn).
OBJECTIVE FOCUS KNOB	Allows one to focus by turning the objective lens counterclockwise to infinity focus (approximately 1/3 turn between a near to a far focus setting).

Table 3-1. Operator's Controls and Indicators for AN/PVS-5, -5A, -5B, and -5C NVG. (Continued).

CONTROLS AND INDICATORS	FUNCTION
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WARNING

Two major disadvantages occur when the IR illuminator is used. First, it makes the NVG an active IR system and when illuminated the operator is subject to detection by enemy systems. Second, when the illuminator is used, the battery power is consumed six times faster.

IR ILLUMINATOR

The IR illuminator is a flash light for conditions of extreme darkness up to 2 meters. When used, the IR draws more battery voltage.

IMAGE INTENSIFIER

When power is on, the image intensifier glows green as seen through the eyepieces.

LEVER CLAMP (Wing Nut)

Allows for adjustment of binoculars for proper distance between the pupils of your eyes.

Table 3-1. Operator's Controls and Indicators for AN/PVS-5, -5A, -5B, and -5C NVG - Continued.

CONTROLS AND INDICATORS	FUNCTION
ROTARY SWITCH KNOB	Turns goggles and IR illuminator on and off. Turn to ON to use goggles, and to OFF when goggles are not in use. When in the ON position, pull switch down and turn to IR position for close reading.

3-2 PREPARATION FOR USE

WARNING

Do not operate the goggles until you have read and understand all operation instructions.

CAUTION

This equipment is a precision electro-optical instrument and must be handled carefully. Keep caps on objective and eyepiece lens when not in use. Do not expose the unprotected objective lens to bright light with power applied to goggles. Damage to the image intensifier can result.

- a. Remove goggles from carrying case.

CAUTION

Neck cord must be placed around the users neck when goggles are removed from carrying case.

- b. Place neck cord around your neck.
- c. Ensure rotary switch is in the OFF position.

CAUTION

The rotary switch must be in the OFF position when installing batteries.

NOTE

If the rotary switch setscrew becomes loose, tighten with the socket head key. Periodically check and tighten self-locking nut inside clamp knob.

WARNING

Do not use mercury or rechargeable NiCad batteries. Using these batteries could result in a system failure which could cause personal injury.

WARNING

Danger of Explosion

Do not transport batteries in pockets, or other containers, containing metal objects such as coins, keys, etc. Metal objects can short circuit batteries and cause them to become very hot. The BA-5567/U lithium batteries could explode.

WARNING

The BA-5567/U lithium battery contains sulphur dioxide gas under pressure and should be handled in the following manner.

- The BA-5567/U lithium batteries have safety vents to prevent explosion. When they are venting sulfur dioxide gas, you may smell it or hear the sound of gas escaping. When the safety vents have operated, the batteries are fairly safe from bursting, but will be hot and must be handled with care.
- Do not heat, puncture, disassemble, short circuit, attempt to recharge, or otherwise tamper with the batteries.

WARNING CONTINUED

- Turn off the equipment if the battery compartment becomes unduly hot. Do not open the battery compartment, but turn in the goggles to the maintainer and report the problem.

FIRST AID

For first aid or artificial respiration, see FM 21-11, First Aid for Soldiers.

d. Remove BA-5567/U lithium battery cap or BA-3058/U alkaline battery cap(s). Insert BA-5567/U lithium battery with recessed (+) side in first. Insert alkaline batteries with flat (-) end in first (fig. 3-4).

WARNING

(AN/PVS-5B/5C) Do not use the goggles with more than one type of battery at a time. Putting both battery types in your goggles at the same time draws off power and will severely reduce battery life of both types.

NOTE

The BA-5567/U lithium battery compartment is the same for the AN/PVS-5, and -5B, and -5C. The upper battery compartment (BA-3058/U alkaline battery is on the top of the face mask for -5B as shown below and -5C as shown in figure 3-3).

- e. Replace battery cap and tighten firmly to insure water-tight seal.

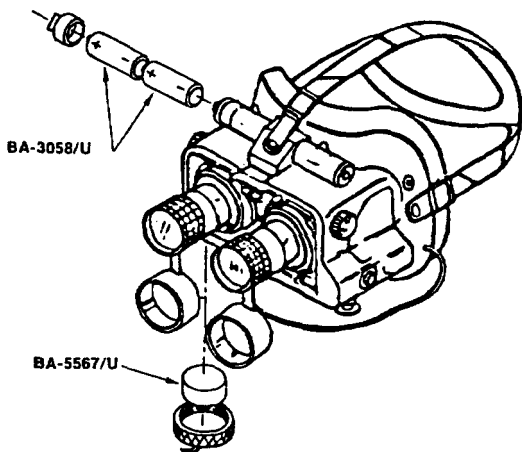


Figure 3-4. Battery Installation (AN/PVS-5B Shown).

f. Snap headstrap to face mask making sure all straps are extended to their maximum lengths.

g. Move the objective focus knob and diopter adjustment ring through their range.

h. Remove eyepiece lens cap and objective lens caps.

i. Loosen lever clamp (wing nut) and adjust monoculars for approximate distance between eyes. Tighten lever clamp (wing nut) finger tight.

CAUTION

Do not over tighten lever clamp (wing nut) and clamp knobs. Do not backoff the clamp knob more than half a turn.

j. Loosen clamp knobs and straighten frame assembly and tighten clamp knobs finger tight.

WARNING

Under arctic conditions the cold weather mask or other covering (band aid) should be worn under the goggles to prevent frost bite possible at facial contact points.

Section II. Preventive Maintenance Checks and Services (PMCS) for Ground Use.

3-3 PMCS TABLE

a. General. Table 3-2 is provided so you can keep your equipment in good operating condition and ready for its primary mission.

b. Warnings and Cautions. Always observe the warnings and cautions appearing in the table. Warnings and cautions appear before applicable procedures. You must observe the warnings and cautions to prevent serious injury to yourself and others, or to prevent your equipment from being damaged.

c. Explanation of Table Entries.

(1) Step Number Column. Step numbers are included to assist you in performing the checks.

(2) Location, Check Column. This column provides the location and the item to be checked.

(3) Procedure Column. This column gives the procedure you must do to check or service the item listed in the Check/Service column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.

(4) Item Not Usable If: Column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make

checks that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

d. Other Table Entries. Be sure to observe all special information and notes that appear in your table.

NOTE

If goggles fail to operate follow the troubleshooting procedures in Chapter 4, Section II. Report any deficiencies in accordance with DA Pam 738-750.

Table 3-2. Preventive Maintenance Checks And Services (PMCS)

ITEM NO.	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USEABLE IF
BEFORE OPERATION CHECKS			
		<p style="text-align: center;">NOTE</p> <p>Perform checks in order listed. Set rotary switch to OFF.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>Operate NVG under night time conditions or in a dark room.</p> <p style="text-align: center;">NOTE</p> <p>Place neck cord around neck.</p>	
1	Neck Cord	Inspect neck cord for security, breaks, frayed, or missing.	Neck cord, if not secured, broken, frayed, or missing.
2	Objective lens focus knob	Rotate knob and check for free movement, approximately 1/2 turn.	Focus knob binds.

**Table 3-2. Preventive Maintenance Checks And Services
(PMCS)(Continued)**

ITEM NO.	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USEABLE IF
3	Objective lens	<p>Inspect all lenses for cleanliness, scratches, chips, or cracks. If necessary clean with lens paper.</p> <p>Objective lenses must be of the same type (matched - both AN/PVS-5A, or -5B, or-5C).</p>	<p>Cracked, chipped, or broken.</p> <p>Objective lenses are not matched pairs.</p>
4	Eyepiece lens	Inspect lenses for cleanliness, scratches, chips, or cracks. If necessary clean with lens paper.	Cracked, chipped, or broken.
5	Face Mask	Inspect.	Face mask cracked.
6	Straps	Inspect straps for holes, rips, defective fasteners, or other damage.	<p>Torn straps, missing, or broken fasteners.</p> <p>Straps contain any residual decontamination chemicals that were absorbed during a decontamination operation.</p>

Table 3-2. Preventive Maintenance Checks And Services (PMCS) (Continued).

ITEM NO.	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USEABLE IF
7	Clamp knobs	Check to see that the binocular assembly moves freely can be secured and lock nuts are present and secure.	Binocular assembly doesn't adjust or lock secure.
8	Lever Clamp (Wing Nut)	Check to see if the monoculars will move freely for pupillary adjustment when the lever clamp (wing nut) is loosened but do not move when the wingnut is tightened.	Monoculars do not move when the lever clamp (wing nut) is loosened. Monoculars are moveable when the wing nut is tight. Lever clamp (wing nut) is missing.
9	Diopter adjustment ring	Rotate diopter adjustment rings to see that they move freely, approximately 1/4 turn.	Diopter adjustment ring binds or fails to turn freely
10	Battery Cap	Inspect caps for stripped threads and damaged, missing preformed packing (o'rings), or missing spring.	Damaged or missing battery cap, preformed packing, spring, or cap can not be tightened to insure watertight fit.

Table 3-2. Preventive Maintenance Checks And Services (PMCS) (Continued).

ITEM NO.	LOCATION/ ITEM TO CHECK	PROCEDURE	NOT USEABLE IF
11	Battery Compartments	<p>Check for Corrosion or Damage to contacts.</p> <p style="text-align: center;">NOTE</p> <p>Use only one battery compartment at a time. Check both compartments for batteries before stowing.</p>	Contacts are corroded or damaged.
<u>DURING OPERATION</u>	<u>CHECKS</u>	<p style="text-align: center;"><u>CAUTION</u></p> <p>Remove all batteries before checking rotary switch.</p> <p>Check mechanical action of switch. Check for looseness. Tighten setscrews with socket head key. Insert batteries.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>Operate the goggles under nighttime conditions only.</p>	Switch setscrew can not be tightened or switch knob is missing. Switch rotates in face mask.

Table 3-2. Preventive Maintenance Checks And Services (PMCS) (Continued).

ITEM NO.	LOCATION/ITEM TO CHECK	PROCEDURE	NOT USEABLE IF
		<p>Place rotary switch in ON position - Observe green glow is visible in each eye-piece after a short delay.</p> <p>Place rotary switch in IR position. Pass hand directly in front of goggles. Contrast should be bright and evident.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>Demisting shields will be damaged if wiped while wet or with wet lens paper.</p>	<p>Green glow is not visible in one or both pieces.</p> <p>If contrast is not evident or IR illuminator comes on without having to pull down the switch knob.</p>
13	Demisting Shields	<p>Inspect for dirt, dust, fingerprints, scratches, chips or other damage.</p> <p>Wipe with dry lens paper. When demisting shield is dry, stow in carrying case.</p>	Damaged or missing.
14	Sacrificial Filter Caps (AN/PVS-5B AND -5C)	Inspect for scratches, chips, or other damage.	Damaged or missing.

Table 3-2. Preventive Maintenance Checks And Services (PMCS) (Continue).

ITEM NO.	LOCATION/ITEM TO CHECK	PROCEDURE	NOT USEABLE IF
15	Image viewed	<p>Check for unacceptable shading, edge glow, flashing, flickering, or intermittent operation (refer to para. 2-4 Inspection Criteria for Proper Image Intensifier Operation).</p> <p>NOTE</p> <p>Operator may use the TS-4348/UV to perform the optional resolution check refer to para 2-3).</p>	presence of any one or more faults.
<u>AFTER OPERATION CHECKS</u>			
16	NVG	<p>Turn NVG off. Replace lens caps. Loosen lever clamp (wing nut) knobs. Remove all batteries and place in carrying case. Inspect batteries and battery compartment for corrosion or leaking batteries. Place NVG, eyepiece first, in the carrying case.</p>	

Section III. Operation Under Usual Conditions.

3-4. OPTIONAL CHECK USING THE TS-4348/UV TEST SET.

Refer to paragraph 2-3 for resolution testing and paragraph 2-4 for Shading, Edge glow, and flashing, flickering, or intermittent Operation.

3-5 WEARING GOGGLES FOR GROUND USE

- a. Place neck cord around neck.
- b. Ensure rotary switch is in the OFF position.
- c. Remove the eyepiece lens caps
- d. Bend your head so that you are facing the ground (fig. 3-5).
 - e. With straps loosened, place goggle head strap on your head, grasp headstrap side (horizontal) band adjustment with both hands and slowly pull band adjustment until face mask cushion just touches your face. Continue pulling straight back on straps until goggle feels snug.
 - f. With your head still bent, grasp center (vertical) band adjustment and pull until snug (fig. 3-6).
 - g. Lift head to normal viewing position and make final adjustments on all bands until you have a comfortable stable fit.
- h. Remove objective lens caps.



Figure 3-5. Placing Goggles on Head.

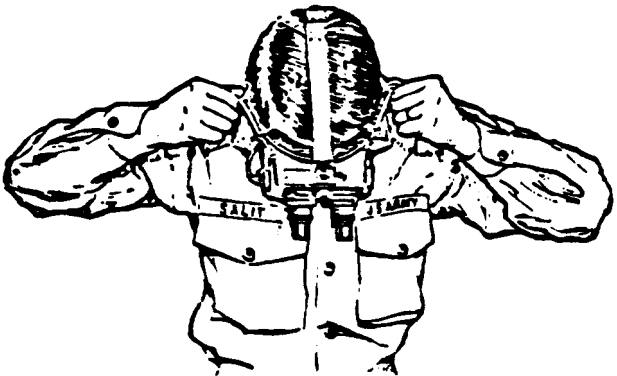


Figure 3-6. Adjusting NVG Headstraps on Head.

3-6 OPERATION PROCEDURES

a. Setting the Controls and Adjustments.

The AN/PVS-5, -5A, -5B, and -5C NVG are designed to adjust for differences in head shape and corrects for most differences in eyesight. The eyepiece lenses are adjusted in or out by turning the diopter adjustment ring. Each monocular is adjustable through a range of +2 to -4 diopters minimum. Familiarize yourself with the illustrated components of the goggles (fig. 3-1 thru 3-3).

CAUTION

Perform the following procedures in the dark.

(1) Make sure the batteries are installed as described in paragraph 3-2d. Remove the objective lens caps and eyepiece lens caps.

(2) Turn the rotary switch to ON position. A green glow will appear in each eyepiece (after a slight delay).

(3) Diopter adjustment rings. After the eye relief is set the diopter adjustment ring adjusts between the eye and the eyepiece. Adjust both eyepieces by turning the diopter adjustment rings counterclockwise to the left (sets it at +2 to -4). If does not correct for astigmatism.

(4) Objective focus knobs. Adjust both objective focus knobs to infinity, all the way counterclockwise to the left and back approximately 1/16 of a turn to infinity. If the object focused on is less than 100 to 200 feet away, the focus knobs will be adjusted slightly to the right. Adjustment of the objective focus knobs regulate the target distance that is in focus. The objective focus knobs are located right on the objective lenses.

(5) Lever clamp (Wing nut). Loosen the lever clamp (wing nut) clockwise to the right and gently pull the monoculars apart to their fullest extent. Then, gently push the monocular together to attain a proper sight picture.

(a) The proper sight picture has one circular image with a slight overlap.

(b) An improper sight picture maybe due to the monocular being improperly positioned before the eyes.

(c) Tighten the lever clamp (wing nut) clockwise, finger tight. Do not over tighten the lever clamp (wing nut).

(6) Clamp knob adjustment.

(a) Tilt. Loosen the clamp knobs counterclockwise and adjust the monocular to attain the desired monocular tilt. The monocular have a tilt range of 25 degrees, far more than necessary.

(b) Eye relief. The monocular may be adjusted fore and aft in the slot of the face mask assembly within a 0.39 inch (10mm) ranges. Start by placing the monocular as close to the eye as possible and then move them outward. The position is a matter of individual preference. Army policy is to optimize field of view (FOV). Placing the monocular close to the eye will allow an excellent view of the monocular image. If the monocular lenses are more than 0.71 inch (18mm) from the eye, the FOV will be less than 40 degrees.

NOTE

If the eyepiece lenses are not properly aligned with the eyes, optimal resolution will not be achieved. Proper alignment of the eyepiece lenses is achieved when distance between the monocular matches the distance between your pupils and the line of sight is the same as the vertical angle of the binoculars. When all the eyepiece adjustments (eyespan, vertical, and tilt) are properly set, the edges of the images in both monocular will be clear.

(c). Tighten the clamp knobs clockwise, finger tight. Do not over tighten the knobs.

b. Focus Adjustment Procedure. Ground Use. Over accommodation and/or focus imbalance between the eyes can cause eyestrain and periodic blurred vision. To achieve a clear and relaxed binocular focus, use the following procedure to accomplish focus adjustments when there are no indoor facilities or to accomplish fine objective focus adjustments when the indoor procedure is used.

NOTE

- When setting the diopter adjustment, it is possible to achieve a clear image in each eye (monocular) and yet have a blurred image or develop eyestrain when viewing with both eyes (binocular).
- The following procedure is performed outdoors at night wearing the goggles.

(1) Preset objective focus knob and diopter adjustment ring of both monocular fully counterclockwise.

(2) Turn on the NVG.

(3) Look at the edge or some detail of a building or other man made structure about at least 100 feet (33 meters) away.

(4) Cover your left eye or cup your hand over the left objective lens. Do not close your left eye. Be careful not to touch the lenses.

NOTE

If the diopter adjustment focus has been set using the indoor procedure, skip the following step.

(5) Turn the right diopter adjustment ring clockwise until you first obtain a clear image, and stop.

NOTE

If you continue to turn the diopter adjustment ring clockwise, the image may seem clear initially, but you could experience eyestrain or headaches after prolonged use.

(6) Refine the focus of the right objective lens by very slowly turning the right objective focus knob until the sharpest image is obtained.

(7) Repeat steps (3) through (6) above for the left monocular.

(8) After adjusting both monocular for best focus, cover the objective lens of the left monocular and view the right monocular checking to see if the image is still clear. Then cover the right monocular with the right hand and view the image through the left monocular. If either monocular is not clear, repeat steps (2) through (5).

(9) With both eyes open, make final objective focus adjustments. If necessary, make minor adjustments.

NOTE

Make minor adjustments for best focus to either monocular with both eyes open.

(10) Turn off the goggles.

c. Reading Use Operation.

NOTE

Keep both eyes open while focusing.

(1) Turn on NVG to the IR position by pulling the switch down and turning clockwise.

(2) Check that the IR illuminator has been turned ON by passing your hand directly in front of the goggles. If contrast appears extra bright, turn the LED OFF by turning the rotary switch to ON position from the IR position.

(3) Preset objective focus knobs all the way to the right fully clockwise to view up close.

(4) Cover left eye. Keep both eyes open. Adjust right diopter adjustment ring until viewing area becomes as clear as possible.

(5) Adjust right objective focus knob for clearest image on reading material.

(6) Cover right eye. Keep both eyes open. Adjust left diopter adjustment ring until viewing area becomes as clear as possible.

(7) Adjust left objective focus knob for clearest image while looking at object to be read.

(8) Have observer wearing NVG check carefully for stray light that may be visible at edges of face mask cushion assembly.

- (9) Turn off goggles.

3-7 IR ILLUMINATOR OPERATION FOR GROUND USE.

WARNING

The IR illuminator is for conditions of extreme darkness. The light from the illuminator can be detected by the enemy using night vision devices so only use the IR illuminator for emergencies. The purpose of the IR illuminator is for viewing within approximately 6 feet (2 meters).

a. IR Operation Procedure.

- (1) Pull down and turn rotary switch to IR position and observe that the area in your immediate front is lighted. As the IR illuminator is turned on, the momentary flash that you see is normal.

WARNING

Two major disadvantages occur when the IR illuminator is used. First, it makes the NVG an active IR system and when illuminated the operator is subject to detection by enemy systems. Second, when the illuminator is used, the battery power is consumed six times faster.

- (2) Check that IR illuminator has been turned on by passing your hand directly in front of goggles. If contrast appears extra bright on your hand, the IR illuminator is lighted.

3-8 DEMISTING SHIELDS

See paragraph 2-8.

3-9 SHUTDOWN PROCEDURE

a. Remove goggles.

- (1) Shut down goggles by turning rotary switch to OFF.
- (2) Unsnap side straps.
- (3) Unsnap top vee-strap.

CAUTION

When removing headstrap at fastener, lift snap at LIFT DOT (fig. 3-7) only to avoid tearing the strap or breaking through the face mask. The white dot on the strap's button is the only place the button releases on its own. The LIFT Dot is not on the AN/PVS-5B headstrap.

- (4). Replace objective lens caps and eyepiece caps.
- (5). Unscrew battery caps.
- (6). Remove BA-5567/U lithium battery or BA-3058/U alkaline batteries from battery compartments.
- (7). Replace battery caps.
- (8). Loosen clamp knobs and lever clamp (wing nut).

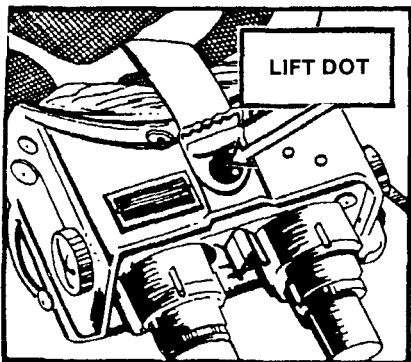


Figure 3-7. Lift Dot for Raising the Center Strap.
(AN/PVS-5 and -5A are shown)

CAUTION

Failure to loosen the clamp knobs and lever clamp (wing nut) before stowing could result in damage to the face mask.

(9). Place goggles and batteries in carrying case and secure latch.

(10). Place carrying case in fitted portion of storage case.

(11). Latch storage case.

Section IV Operation Under Unusual Conditions

3-10. OPERATION IN ARCTIC CONDITIONS.

WARNING

Under arctic conditions, the cold weather mask or other covering should be worn under goggles to prevent frost bite at possible facial contact points.

a. When outside temperatures are at below 0° F (-17.8°C), the demisting shields may fog up after approximately one hour's operation. When below 0° F, the proper number of demisting shields must be available to change when frosting occurs (para 2-8 for installation procedures).

NOTE

Wearing cold weather mittens will make turning the rotary switch knob and making adjustments difficult.

b. Exercise extreme caution when driving over snow covered ground during periods of starlight ambient light conditions because visibility may be degraded and you may experience high reflective (white out) conditions.

3-11. OPERATION IN DUSTY OR SANDY AREAS.

Refer to paragraph 2-11.

3-12. OPERATION IN RAINY OR HUMID CONDITIONS.

Refer to paragraph 2-12

3-13. OPERATION IN SALT WATER AREAS.

Refer to paragraph 2-13.

3-14 WEARING NVG WITH DH-132 COMBAT VEHICLE CREWMAN'S (CVC) HELMET.

- a. Attaching goggles to CVC helmet.

NOTE

If the Velcro is not installed and fastener stud, take the helmet and goggles to the maintainer for modification.

- (1) Place neck cord around neck and place CVC helmet on head.

- (2) Install batteries per paragraph 3-2b.

- (3) Remove eyepiece lens caps.

- (4) Attach the Velcro Vee-strap to the Velcro pads on the helmet (fig. 3-8).

- (5) Snap two side straps to fastener studs on each side of the helmet.

- (6) Adjust side straps using band adjustment until you have a comfortable, stable fit.

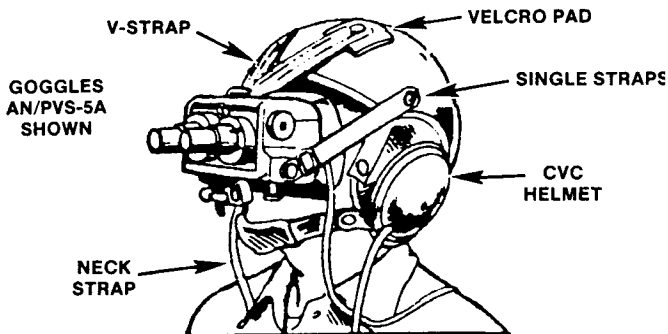


Figure 3-8. AN/PVS-5A Mounted on CVC Helmet.
(AN/PVS-5B and -5C mount is similar).

WARNING

Extreme care should be taken to see that no stray light is visible from goggles when in operation (to prevent detection by the enemy). Have observer check carefully for stray light visible at edges of face mask.

(9) Remove objective lens caps and follow Operation Procedures in Section III of this chapter.

b. Removing Goggles and Helmet.

(1) Shutdown goggles by turning the rotary switch to OFF.

(2) Install objective lens caps.

(3) Install eyepiece lens caps.

(4) Remove the Velcro Vee-strap at the Velcro pads on the helmet.

(5) Unsnap two side straps at the fastener studs at each side of the helmet.

(6) Remove batteries per paragraph 3-2b.

(7) Remove CVC helmet from head.

(8) Remove neck cord from around neck.

(9) Follow Shutdown Procedures in paragraph 3-9 before placing goggles in carrying case.

CHAPTER 4. MAINTENANCE INSTRUCTIONS

Section I. GENERAL INFORMATION

4-1 LUBRICATION


There are no lubrication requirements for the goggles.

Section II. TROUBLESHOOTING PROCEDURES

Table 4-1 lists common malfunctions that you may find with your equipment. Perform the probable causes and corrective actions in the order they appear in the table.

NOTE

The troubleshooting malfunctions are applicable to all the AN/PVS-5, -5A, -5B, -5C, GM-6(V)1, and GM-6(V)2 unless identified as GM-6. The malfunctions and probable causes identified as GM-6 are applicable both the GM-6(V)1 and GM-6(V)2.



This table cannot list all the malfunctions that may occur, all the probable causes needed to find the fault, or all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or actions listed do not correct the fault, notify your maintainer.

Table 4-1. Troubleshooting Procedures.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
No Green Glow visible in either eyepiece when power is turned ON.	Check for missing or bad battery.	Install a new battery.
	Check for caps covering lenses.	Remove lens caps.
	Defective goggles	Return goggles to maintainer
	GM-6. Electrical contacts are dirty or corroded.	Use a dry cloth or pencil eraser to clean all electrical contacts.
	GM-6. Power Cable connectors not properly engaged.	Reconnect.
	GM-6. Broken power cord for visor mount or power pack.	If power cord is damaged, return power pack and/or visor mount to the maintainer.
No green glow in one eyepiece.	Check for cap over lens:	
	If cap is over lens.	Remove cap
	If cap is not the problem.	Return goggles to maintainer

Table 4-1. **Troubleshooting Procedures - Continued.**

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Poor image quality	Check to ensure the objective focus knob and diopter adjustment knob can be moved freely.	Adjust the objective focus knob and diopter adjustment ring for a clear view. Focus in accordance with checks para. 2-6c and 3-6b.
	Lenses, demisting shield, or sacrificial filter caps are dirty.	Clean the lenses (para 4-2).
	Defective objective focus knob and diopter adjustment ring	Return to the maintainer
Battery cap difficult to turn.	Damaged battery cap.	Refer NVG to the maintainer
Intermittent operation.	GM-6. Defective mount or binocular.	Turn in NVG and visor mount to the maintainer.
	GM-6. Defective battery pack.	
Poor image quality.	Objective lenses or eyepiece lenses not focused correctly or lenses are fogged or dirty.	Adjust the focus of the lenses or clean them. If the image is still not clear, or the lenses are fogged internally, turn in the NVG to the maintainer.

Table 4-1. Troubleshooting Procedures - Continued.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
NOTE		
Operator may use the TS-4348/JV to assist in checking the viewed image (refer to para 2-3).		
Eye-span adjustment cannot be made.	Defective lever clamp (wing nut).	Turn in NVG to the maintainer.
GM-6. Binocular will not lock in visor mount.	Visor or mounting hardware is dirty or broken.	Clean the mounting hardware. If problem persists., the mechanism is damaged. Turn in the GM-6 and visor mount to the maintainer.
GM-6 (V) 1. Visor will not operate in visor mount assembly.	Visor or mount inoperable.	Turn in helmet to the maintainer.
	Visor link defective.	Turn in helmet to the maintainer.

Table 4-1. **Troubleshooting Procedures - Continued.**

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
GM-6. Low-battery indicator will not illuminate during check.	Batteries defective or missing.	Install new batteries.
	Batteries improperly installed.	Install correctly.
	Poor power cable connection.	Check connector.
	Defective power pack.	Turn in power pack to the maintainer.
	Defective visor mount.	Turn in Helmet to the maintainer.
Operator experiences eyestrain, headaches, or nausea while using goggles.	Incorrect focus	Refocus
	Collimation off or poor image.	Turn in NVG to maintenance personnel for collimation check and visual image check.
IR illuminator fails to activate (AN/PVS-5 series)	Defective goggles.	Refer to higher level of maintenance.
IR illuminator comes on without pulling out the switch knob.	Defective rotary switch.	Refer to higher level of maintenance.
Headstrap cannot be tightened (All but GM-6).	Defective fasteners or straps.	Turn in to the maintainer.

Section III. Maintenance Procedures.

Operator maintenance of the NVG is limited to cleaning the system and drying the system for storage.

4-2 CLEANING THE NVG.

a. Cleaning the goggles.

(1) Carefully brush off any loose dirt using only a soft, lint free cloth (shop towel).

(2) Moisten the cloth with fresh water and gently wipe the external surfaces (except lenses) so NVG are free of foreign material.

(3) With another dry, clean, soft, lint-free cloth (shop towel), dry any wet surfaces (except lenses).

b. Cleaning lenses.

(1) Using lens paper, carefully remove all loose dirt from the lenses.

(2) Dampen a folded lens paper with clean water and lightly and slowly wipe the lenses. After one straight stroke, discard the lens paper. Repeat this step until the glass surfaces are clean.

c. Cleaning sacrificial filters caps.

(1) Using lens paper, carefully remove all loose dirt from the lenses.

(2) Dampen a folded lens paper with clean water and lightly and slowly wipe the caps. After one straight stroke, discard the paper. Repeat this step until the glass surfaces are clean.

d. Cleaning Demisting Shields.

NOTE

Demisting shields will be damaged if wiped while wet or with a wet lens paper.

(1) With a dry lens paper, wipe the demisting shields.

APPENDIX A

REFERENCES

A-1 SCOPE

This Appendix lists all forms, technical manuals, and miscellaneous publications referenced in this manual.

A-2 FORMS

Recommended Changes to Equipment	DA Form 2028-2
Recommended Changes to Publications and Blank Forms	DA Form 2028
NVG Inspection and Maintenance Form	DA Form 2408-30
Product Quality Deficiency Report	SF 368

A-3 FIELD MANUALS

NBC Contamination Avoidance	FM 3-3
NBC Decontamination	FM 3-5
First Aid for Soldiers	FM 21-11

TM 11-5855-238-10

A-4 TECHNICAL MANUALS

Procedures for Destruction of Electronic Material to Prevent Enemy Use TM 750-244-2

Test Set, Electrical System TS-4345/UV

A-5 MISCELLANEOUS PUBLICATIONS

Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items). CTA 50-970

Army Medical Department Expendable/Durable Items. CTA 8-100

Consolidated Index of Army Publications and Blank Forms. DA Pam 25-30

Army Logistics Readiness and Reporting. DA Pam 700-138

The Army Maintenance Management System (TAMMS). DA Pam 738-750

Functional Users Manual for the Army Maintenance Management System-Aviation (TAMMS-A) DA Pam 738-751

Primary Battery Supply
Data

SB 11-6

What You Should Know
About LiSO₂ Batteries for
Army Application

TB 43-0130

Battery Disposition/Dis-
posal Handbook

TB 43-0134

Operator's and Organiza-
tional Maintenance Man-
ual, including Repair parts
and Special Tools List for
the SPF-4 Helmet.

TM 10-8415-206-12&P

Electronic Systems Test
Set, TS4348/UV.

TM 11-5855-299-12

Aviator's Night Vision Im-
aging System Test set, TS-
3895/UV and TS 3895A/UV.

TM 11-5855-264-14

APPENDIX B
COMPONENTS OF END ITEM LIST (COEI)
BASIC ISSUE ITEMS (BII) LISTS

Section I. Introduction.

B-1. SCOPE

This appendix lists components of the end item and basic issue items for the NVG to help you inventory items required for safe and efficient operation of the equipment.

B-2. GENERAL

The COEI List is divided into the following sections:

a. Section II. Components of the End Item. This listing is for information purposes only and is not authority to requisition replacements. These items are part of the NVG but they are to be removed and separately packaged for transportation or shipment. 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 help you find and identify the items.

b. Section III. Basic Issue Items. These essential items are required to place the NVG in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the NVG during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE.

B-3. EXPLANATION OF COLUMNS

a. Column (1) Illustration Number (ILLUS. No.) This column gives you the number of the item illustrated.

b. Column (2) National Stock Number. Indicates the national stock number (NSN) assigned to the item to be used for requisitioning purposes.

c. Column (3) Description, CAGEC and Part Number and Usable On Code. This column identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGEC), in parenthesis, and the part number. If the item you need is not the same for different models of the equipment, a Usable On Code will appear on the right side of the description column on the same line as the part number. These codes are identified below:

<u>CODE</u>	<u>USED ON</u>
CO3	AN/PVS-5
DFS	AN/PVS-5A
HKY	AN/PVS-5B
HKZ	AN/PVS-5C
JYR	GM-6(V)1
JYV	GM-6(V)2

d. Column (4) Unit of Issue (U/I). This column indicates how the item is issued for the NSN shown in Column 2.

e. Column (5), Quantity Required (Qty Rqd). This column indicates the quantity required.

NOTE

The GM-6 NVG houses the binocular assembly of either the AN/PVS-5A, -5B, or -5C

Section II. Components of End Items List

1	2	3		4	5
ILLUS NO.	NATIONAL STOCK NUMBER	DESCRIPTION PART NUMBER (CAGE)	USABLE ON CODE	U/M	QTY RQD
1		BINOCULARASSY SM-D-804202 (80063)	CO3,DFS JYR,JYV	EA	1
1		BINOCULAR ASSY 206704-116 (55311)	HKY,JYR JYV	EA	1
1		BINOCULAR ASSY 30051 7-G 1 (66868)	HKZ,JYR JYV	EA	1
2	5855-00-125-0734	FACE MASK ASSY SM-D-657400-2(80063)	CO3,DFS	EA	1
2	5855-01-299-2679	FACE MASK ASSY 206703-004	HKY	EA	1
2	5855-01-258-6180	FACE MASK ASSY A3139220(80063)	HKZ	EA	1
3	5855-00-125-0713	HEADSTRAP ASSY SM-D-657304	CO3,DFS HKZ	EA	1
3	5855-01-334-6594	HEADSTRAP ASSY SM-D-657304-2(80063)	HKY	EA	1
4	5340-00-132-4227	CAP, PROTECTIVE, DUST SM-C-657314-1(80063)		EA	2
5	5340-00-132-4264	CAP, LENS, OBJECTIVE SM-C-657314-2(80063)	CO3,DFS JYR, JYV	EA	2

Section II. Components of End Items List

1 ILLUS NO.	2 NATIONAL STOCK NUMBER	3 DESCRIPTION PART NUMBER (CAGE)	4 USABLE ON CODE	5 U/M	6 QTY RQD
5	5855-01-250-2420	CAP, LENS, OBJECTIVE A3140633 (80063)	HKY,JYR JYV	EA	2
5	5340-00-558-4692	CAP, LENS, OBJECTIVE A3144318 (80063)	HKZ,JYR JYV	EA	2
6	5855-00-125-0403	DEMISTING SHIELD ASSY SM-C-657428(80063)	CO3,DFS HKZ	EA	2
6		DEMISTING SHIELD ASSY 200428-110(55311)	HKY	EA	2
7	6640-00-240-5851	LENS TISSUE 354 (06650)		EA	1
8	5120-00-198-5401	KEY, SOCKET HEAD AW1-1-2 (55719)	CO3,DFS HKY,HKZ	EA	1
9	5855-01-250-2348	FILTER CAP, SACRIFICIAL A3140650 (80063)	JYR,JYV HKY	EA	2

Section II. Components of End Items List

1 ILLUS NO.	2 NATIONAL STOCK NUMBER	3 DESCRIPTION PART NUMBER (CAGE)	4 USABLE ON CODE	5 U/M	6 QTY RQD
9	5855-01-246-8271	FILTERCAP, SACRIFICIAL A3144264 (80063)	HKZ,JYR JYV	EA	2
10	5855-01-149-4108	FASTENER, TAPE, HOOK AND PILE 5002516-2 (54490)		YD	
11	5855-01-138-2317	CASE ASSY, CARRYING SM-D-657430 (80063)	CO3,DFS JYR, JYV	EA	1
11		CASE ASSY, CARRYING 206701-119 (55311)	HKY,JYR JYV	EA	1
11	6650-01-315-1167	CASE, OPTICAL INSTRUMENT 300562-G 1 (66868)	HKZ,JYR JYV	EA	
12	1240-00-137-7768	CASE ASSY, SHIPPING AND STORAGE SM-D-657440 (80063)		EA	
13	5855-01-151-4229	MOUNT ASSEMBLY 5002530 (54490)	JYR	EA	

Section II. Components of End Items List

1 ILLUS NO	2 NATIONAL STOCK NUMBER	3 DESCRIPTION PART NUMBER (CAGE)	4 USABLE ON CODE	5 U/M	6 QTY RQD
14	5855-01-300-2301	VIEWER MOUNT ASSEMBLY 209044-100 (55311)	JYR	EA	1
15	5855-01-149-4104	POWER PACK ASSEMBLY 300680-G3 (66868)	JYR,JYV	EA	1
16	6160-01-372-5994	AA BATTERY CARTRIDGE 5008902(54490)	JYR,JYV	EA	2
17	5855-01-151-4230	OFFSET MOUNT ASSEMBLY 5002610(54490)	JYV	EA	1
18	5855-01-331-6123	OFFSET VIEWER MOUNT ASSEMBLY A3139263(80063)	JYV	EA	1

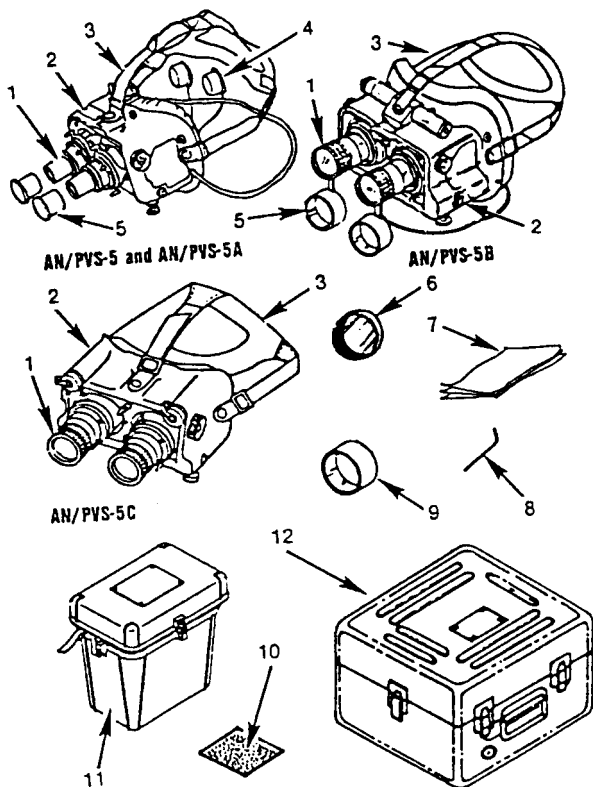
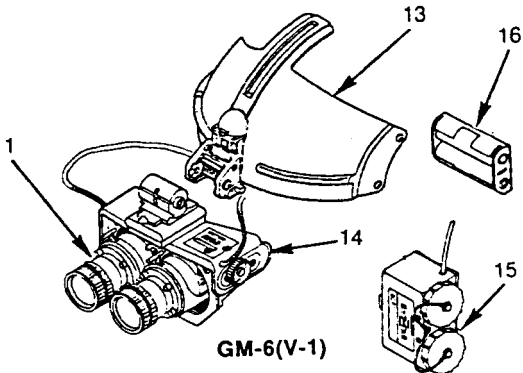
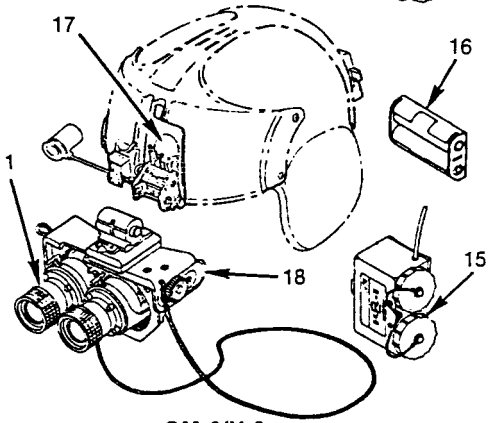


Figure B-1. Components of End Items (COEI)
(Sheet 1 of 2).



GM-6(V-1)



GM-6(V-2)

Figure B-1. Components of End Items (COEI)
(Sheet 2 of 2)

APPENDIX C

ADDITIONAL AUTHORIZATION LIST

Section I. Introduction

C-1 SCOPE

This appendix lists additional items you are authorized for the support of the NVG in this technical manual.

C-2 GENERAL

This list identifies items that do not have to accompany the NVG and that do not have to be turned in with the NVG. These items are all authorized to by CTA, MTOE, TDA, and JTA.

C-3 EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are items you require to support this equipment.

Section II. Additional Authorization List.

1 NATIONAL STOCK NUMBER	2 DESCRIPTION PART NUMBER(FSCM)	3 USABLE ON CODE U/M	4 QTY AUTH
	FLASHLIGHT FILTER #1 FFNVG (OBN56)	EA	1
	FLASHLIGHT FILTER #20 NV-4AM (58774)	EA	1
6625-01-323-9584	TEST SET, ELEC SYSTEM, TS-4348/UV (80058)	EA	1
6135-01-090-5365	BATTERY, LITHIUM BA-5567/U (80058)	EA	1
6135-00-935-2587	B AA BA-3058/U (80058)	EA	2

APPENDIX D

EXPENDABLE AND DURABLE ITEMS LIST

Section I. Introduction.

D-1 SCOPE

This appendix lists expendable and durable items that you will need to operate and maintain the NVG. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-790, Expendable/Durable Items (Except Medical, Class V repair Parts, and Heraldic Items) or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2 EXPLANATION OF COLUMNS

a. Column (1), Item Number. This number is assigned to the entry in the listing and is referred to in the narrative instructions to identify the item (e.g. "Use cleaning compound, item 5, Appendix D.").

b. Column (2), Level. This column identifies the lowest level of maintenance that requires the item.

c. Column (3), National Stock Number. This is the NSN assigned to the item which you can use to requisition it.

d. Column (4), Item Name, Description, Commercial and Government Entity Code (CAGEC), Part Number. This provides the other information you need to identify the item.

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e. Column (5), Unit of Measure (U/M). This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Section II. Expendable and Durable Items List.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	C	6640--00-240-5851	PAPER, LENS 354 (06650)	Pk
2	C	7820-00-823-9773	TOWEL, SHOP	Pk

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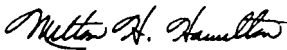
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By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:



MILTON H. HAMILTON
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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

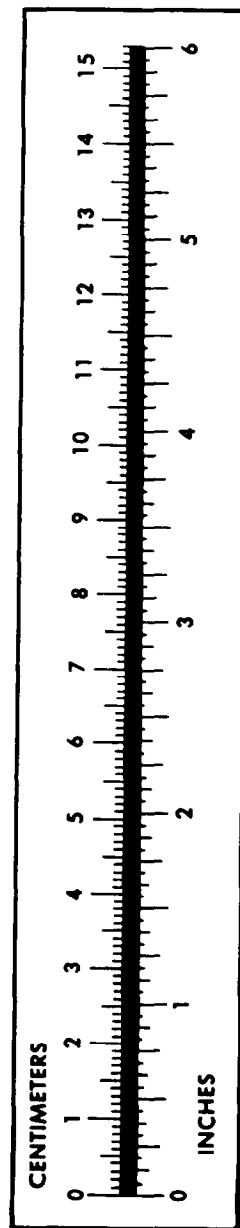
TEMPERATURE

$5/9(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 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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