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US ARMY WAR COLLEGE



# COUNTERINSURGENCY

**LESSONS**

**LEARNED**

**NO. 59**

(DJSM-545-66)

**IMAGE INTENSIFICATION  
DEVICES (U)**

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HEADQUARTERS  
UNITED STATES MILITARY ASSISTANCE COMMAND, VIETNAM  
APO San Francisco 96243

MACJ343

13 July 1966

SUBJECT: Counterinsurgency Lessons Learned No 59: Employment of Image Intensification Devices (U)

TO: SEE DISTRIBUTION

1. (CMHA) INTRODUCTION:

a. A new chapter in night combat operations has now been introduced in Vietnam with arrival of the first generation of passive night vision devices in Dec 1965. Unit commanders, soldiers and operators of these night vision instruments have been impressed by the outstanding results obtained in night combat operations. This group of electro-optical instruments which are passive visual aids for night viewing, utilizes both natural illumination from the moon and stars, and artificially induced light such as flares and searchlights.

b. Presently over 900 of the devices have been issued to various US units in Vietnam. Units of the 1st Cavalry Division (Airmobile), 1st Infantry Division, 25th Infantry Division, 1st Brigade of the 101st Airborne Division, 173d Airborne Brigade, 5th Special Forces Group and 7th Air Force have been using the night vision instruments in night combat operations to develop techniques of employment, capabilities, limitations and requirements. Combat operational successes, particularly with the small Starlight Scope both on the surface and from the air have resulted in an urgent demand for thousands more of these devices.

c. The Army Concept Team in Vietnam is currently evaluating the first generation of image intensification night vision equipment used by US Army units in the Republic of Vietnam in order to obtain data on the employment, maintenance, system performance and to recommend the basis of issue. The report of this evaluation is expected in July of this year. Some of the preliminary results of the evaluation and suggested techniques for employment of the night vision devices are included in this paper.

d. The Air Force Test Unit has completed evaluation of this equipment on aerial observation, surveillance, and attack missions. Their evaluations are also reflected in this publication.

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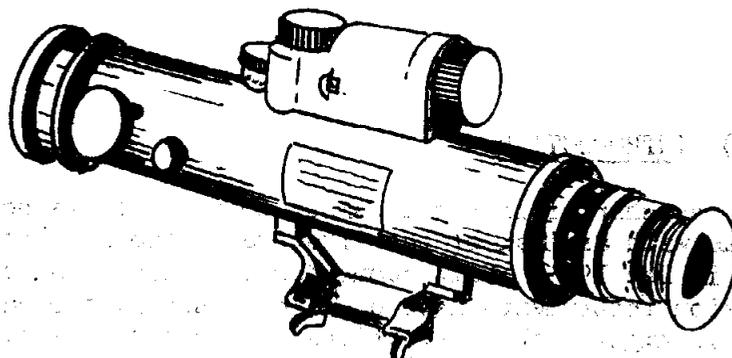
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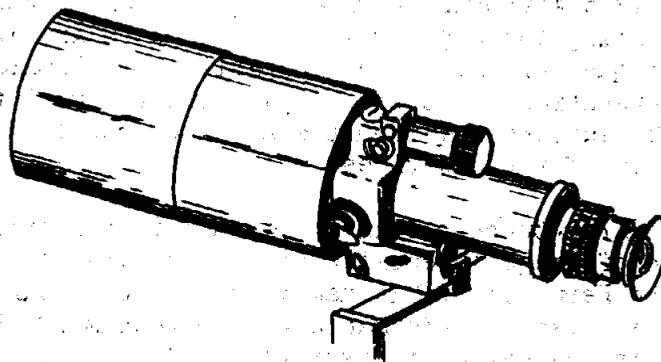
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e. The family of Night Vision Devices (NVD) now available includes the following types.

(1) The Starlight Scope (SSS) which provides battlefield surveillance, target acquisition and delivery of aimed fire from rifles and machine guns within a range of 400 meters.



(2) The Night Vision Sight for Crew-served Weapons (CSWS) which provides battlefield surveillance, target acquisition and delivery of aimed fire from crew-served weapons within a range of 1000 meters.



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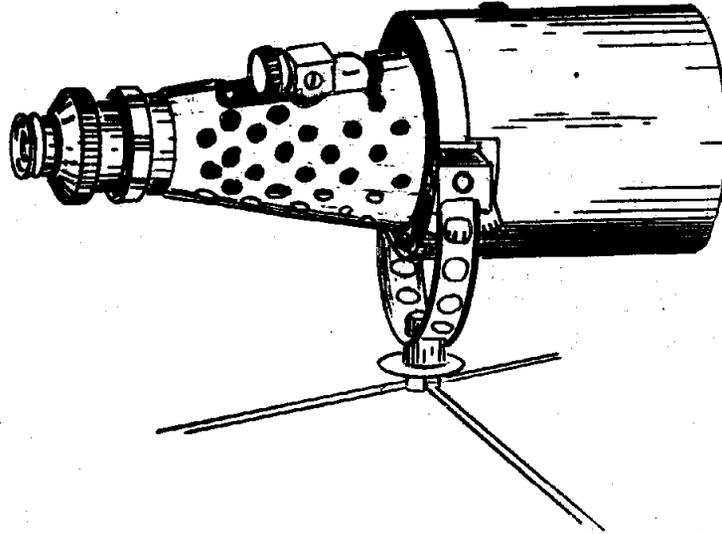
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(3) The Night Observation Device, Medium Range, (NOD) which provides terrain observation and detection of objects of a tactical nature within a range of 1500 meters.



(4) Comparative detailed characteristics of the scopes are listed in inclosure 1.

2. (CMHA) TECHNIQUES OF EMPLOYMENT:

a. General.

(1) Many variables, such as the terrain, vegetation, amount of ambient light and capability of the operator, influence the results obtained in utilizing night vision devices. To cite the extremes, on the darkest night in the jungle a man using the Starlight Scope can see from 10 to 30 meters; on the other hand, under a full moon and a starfilled sky, an observer, using the same scope over open terrain can plainly observe activity and objects out to 500 meters

(2) For general aerial use the night vision devices perform satisfactorily with available ambient light from starlight and at least one fourth of the moon. The effectiveness of the night vision devices varies directly with the amount of ambient illumination. During bright moonlight nights when the cloud cover is light and thin, the operational capability of night vision devices is excellent.

(3) Satisfactory Starlight Scope mounts for aircraft do not yet exist since the scope was designed primarily for surface use. However,

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good results with the Starlight Scope can be achieved by hand holding the instrument or by mounting it on an handheld M-16 rifle.

(4) On nights when insufficient natural ambient light is available, excellent results with night vision devices may be obtained by employing artificial light. Searchlights, artillery and mortar flares properly placed enable the Starlight Scope to operate at peak efficiency. However, if the light source shines directly or is reflected into the lens of the scope, it causes the image to "white-out" or in the case of newer scopes to automatically cutoff. Further, permanent damage may result to the scope which is similar to burned spots on a TV picture tube. The burn spots will mar the presentation of the image and thereby decrease the reliability of the instrument. For this reason flares should be fired to the sides of area under surveillance or high and close with reference to the scope.

b. Ambushes - The Starlight Scope is especially suited for use in an ambush. It assists the operator in surveying the area surrounding the ambush site prior to establishing the ambush and then provides good observation of the approaches to the killing zone. Once the enemy has entered the killing zone the operator is able to place accurately aimed and effective fire on the enemy. The Starlight Scope can be mounted on M-14, M-16, and M-60 weapons.

c. Reconnaissance Patrols - The Starlight Scope is very useful in night reconnaissance patrol activities. It enables the patrol to identify landmarks and reference points at greater distances -- thereby decreasing the number of orientation halts and facilitating rapid patrol movements. Security of the patrol is increased by using Starlight Scope to check danger areas such as open clearings, stream beds, and possible ambush sites prior to the patrol's advance. Better observation of the patrol's objective is obtained and reentry into friendly lines is facilitated.

d. Night Defensive Operations - The night vision devices can be used effectively in night defensive operations by employing the devices at strategic observation and listening posts within and without the perimeter. Improved night visibility permits early detection, identification and engagement of the enemy forces. The Starlight Scope is particularly effective when used in conjunction with the AN-PPS-4 ground radar surveillance equipment. Enemy forces and objectives are detected by radar and identified through improved vision provided by the Starlight Scope.

e. Aerial Techniques of Employment:

(1) An observer using the Starlight Scope on a search and

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destroy mission in the AC-47 can observe enemy movement and activities on a clear night with a quarter moon or better and effectively engage the enemy targets. The navigator observing through the Starlight Scope at the cargo door can easily detect people, vehicles and objects on the highways or in the area of rice paddies and boat movement on the waterways. The optimum altitude for this surveillance is about fifteen hundred feet above the ground. Depending on the amount of moonlight, the scope operator can see the objectives satisfactorily while flying one to two thousand feet above the surface. Once the target is identified, the observer directs the pilot to the target who then fires on the objective.

(2) Slick and gunship helicopters working together can conduct night time operations utilizing the Starlight Scope. Visibility of surface objects with the Starlight Scope is good under a one-eighth and is excellent under one-fourth moon or full moon with clear skies. Optimum speed ranges are from 40-70 knots depending on the altitude and ambient light. Good target identification is obtained from altitudes of one thousand to fifteen hundred feet above the ground. The gunship flies at a higher altitude than the slick and at a distance of one half to one and one half miles to the rear. This distance is necessary as a safety factor since the gun ships fly blackout and the slick flies with the rotating beacon only. When the target is identified, it is marked by the scope operator with tracer fire or trip flares (with the bottom flanges broken off). WP or smoke may be used during periods of one-half moon to full moon. At this point the pilot notifies the gun ship of the nature of target, its location with respect to the marker and his new heading and altitude, i.e., "climbing turn" to 280 degrees at 1000 feet.

(3) If artillery is available, the Fire Support Center is notified of the mission while the objective is being engaged by the gun ships. Upon completion of the gun ships mission, artillery is adjusted on the area using normal observer fire procedures. The following system for artillery fire adjustment can be employed. The M-34 WP grenade is dropped to harass the enemy as well as to mark targets for artillery fire which can be adjusted by the scope operator with excellent results. The easiest method of observing the target while adjusting fire without induced illumination is to fly a figure eight pattern at fifteen hundred feet, centered on and perpendicular to the gun target line, approximately one thousand meters beyond the target.

(4) During periods of less than one-fourth moon on Starlight Scope surveillance missions, navigation may be facilitated by using the Decca navigational system (preferably using the model with the six digit coordinate console). The exact route must be determined and plotted in advance and much of the success of the mission depends upon the pilot's ability to tell the scope operator exactly where he is at all times.

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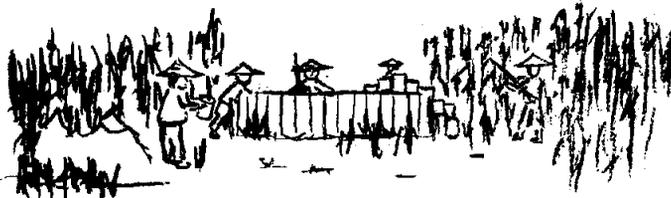
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(5) The UH-1D model helicopter is preferred for Starlight Scope night operations as the two observers can obtain good results by sitting on the rear seat on either side of the transmission. An alternate seating arrangement is to place two seats immediately forward of the door gunners facing outward. The latter system permits better coordination between the scope operator and the door gunner. In addition, the operator can follow the pilots instrument panel for more accurate orientation. By installing a tee plug the observers can be tied into the aircraft interphone net.

3. (CMHA) TACTICAL EXPERIENCES:

a. Combat use of the small Starlight Scope on the surface and from the air has produced impressive results. This scope provides a means for friendly troops to counter and disrupt night operations of Viet Cong and North Vietnamese troops. Selected examples which follow indicate the capabilities and diversified uses of the Starlight Scope during night operations.

b. Beginning with the night of 7 January 1966, under a full moon, the Starlight Scope was used by Detachment A-412, 5th Special Forces Group, to detect VC actions close-in to their camp at Don Chu. Using the scope they observed the VC preparing mortar positions and a command post approximately 1500 meters north from the Special Forces compound. These positions were cleverly concealed and were so constructed as to be impervious to countermortar fires. Special Forces personnel maintained the VC construction team under surveillance each night until completion of their emplacements. A demolitions patrol was sent to destroy the prepared mortar position and CP the following day.



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c. While on a night aerial observation flight in an OH-13 helicopter, an observer of the 3d Brigade, 1st Infantry Division using the Starlight Scope sighted 100 cooking fires in the western portion of the TAOR (Tactical Area of Responsibility). Within the perimeter of the fires, the observer could detect the presence of personnel. The observer marked the target with an M-34 WP grenade. Several VC scrambled to their feet when the grenade exploded. Artillery was then placed on the target and the VC fires disappeared. This action commenced at 0407 hours, 14 February 1966, with the aircraft flying at 45 knots at an altitude of 700 feet above the ground.

d. On the night of 2 March 1966, with nearly a fullmoon, a helicopter borne US Army artillery observer of Battery B, 2/32 FA Battalion used the Starlight Scope while conducting fire on targets of opportunity in the general vicinity of 3d Brigade, 1st Infantry Division at Lai Khe. As a result of electronic radiation reports of activity on the Saigon River and agent reports of movement in the same area, the flight route was diverted to include a surveillance mission along the Saigon River. At 2045 hours, the observer sighted a large 60-man VC motorized junk approximately 30 miles north of Saigon. Prompt artillery fire from a 175mm gun scored a first round hit from a range of approximately 15 km. Another junk was also engaged and sunk a few minutes later from the bracketing volley from two 175s. The remaining VC vessels rapidly dispersed.

e. On 4 March 1966, a sidefiring AC-47 equipped with a Starlight Scope detected, identified and attacked a force of VC who were preparing to attack a nearby town. It was a clear moonlight night and the aircraft was flying at 1500 feet above ground level when approximately 200 VC were sighted in a rice paddy. Fifteen hundred rounds of 7.62 mm were fired at them before machine gun malfunctions forced the aircraft to temporarily withdraw. Later, three thousand rounds were fired into the woods where the survivors of the group had fled while the guns were being repaired. After daylight on the following morning, forward air controllers in an O-1E airplane counted and took pictures of 52 bodies left by the VC in the open rice paddy. The crew of the AC-47 stated that it was only through the use of the Starlight Scope that they were able to see and direct fire against the attackers.

f. Shortly before dawn on 5 March 1966 a reconnaissance patrol of the 2/28 Infantry, using the Starlight Scope detected a company size force of VC moving up the road towards their position. The patrol prepared an ambush site but discovered a second company-sized force of VC a short distance behind the first group. The patrol leader allowed the

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first group to pass and then ambushed the second group inflicting heavy casualties. The first group of VC then returned to the ambush site and entered the fire fight. In the confusion the two groups of VC fired on each other while the patrol withdrew towards the battalion perimeter and called for artillery fire on the VC. Although the patrol leader was killed during the battle, the platoon sergeant credited the Starlight Scope with saving the patrol and stated that it was one of the most useful pieces of equipment he had ever used in combat.

g. On 15 March 1966, an element of the 173d Airborne Brigade in War Zone "D" had an observation post set up as part of its perimeter defense. At 0100 hours, with approximately one-half moon, the Starlight Scope observer spotted and identified six enemy troops moving along a ridge line. The operator adjusted artillery fire on the target area and at the completion of the fire mission was able to observe several bodies lying on the ground. The following morning, a reconnaissance patrol found traces of blood but was unable to confirm a body count.

h. The Starlight Scope was used in conjunction with AN-PPS-4 ground radar surveillance set at the 3d Brigade, 1st Infantry Division's Base Camp at Lai Khe. The Starlight Scope and the radar set were collocated in a tower 75 feet high. The Starlight Scope was used by the radar operators to identify stationary targets which had been located by radar. For several nights the radar operator detected activity along the Lai Khe - Ben Cat road and artillery fire was placed on these targets. A body count could not be confirmed, but bloodstains and equipment were found on two occasions.

#### 4. (CMHA) LESSONS LEARNED:

a. The use of night vision devices in both offensive and defensive operations is limited only by the imagination of the unit commander in his employment of the equipment.

b. The Starlight Scope has aided greatly in developing the individual soldier's confidence in his ability to conduct night operations effectively and aggressively.

c. When used in conjunction with the AN-PPS-4 ground radar surveillance set, the night vision devices provide a more accurate identification of targets sighted on the radar scope.

d. Some weather conditions tend to reduce the effectiveness of these scopes. Fog has a tendency to reduce the ambient light level and also decrease the range. Light haze and smoke has very little effect on

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the sharpness of images. If the objective lens face becomes streaked with water during rain, it will distort the appearance of the area under observation.

e. On dark nights without moon and stars, the night vision devices can be operated at peak efficiency with the assistance of properly employed artificial illumination.

f. Prolonged use of light intensification devices tends to impair the night vision of the user. Therefore the devices should not be used by the pilot who will land the aircraft as in all probability his depth perception and night vision will be impaired.

g. A suitable mount is required to operate the Starlight Scope from O-1E aircraft satisfactorily. The scope cannot be used effectively through the aircraft window or canopy because of the adverse effect of reflections. Using the scope with the window open curtails the observers vision because the airstream presses against the observers face.

h. The night vision scopes are most suitable for linear air surveillance along highways, canals, rivers, coastlines and small areas familiar to the aerial observer.

i. Permanent damage to the night vision devices can result from the exposure of excessive natural or artificial light into the lens of the instrument.

FOR THE COMMANDER:

1 Incl  
Comparative Characteristics

*W. C. Carmichael*  
Wm. C. CARMICHAEL  
1st Col, AGC  
Asst AG

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2 - SJS	
2 - J-1	
14 - J-2	1 - Each SA I, II, III, IV & V ALC
1 - J-32	1 - Combined Studies
500 - J-34	4 - ACTIV
2 - COC	10 - OSD/ARPA
3 - COC (JOD) for JGS	2 - AFTU
2 - J-4	1 - DODSPECREP
2 - J-5	5 - CINCPAC
2 - J-6	1 - Historian
4 - JRATA	5 - COMNAVFORV
25 - Dir of Tng	5 - CO, 5th SFG (Abn)
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COMPARATIVE CHARACTERISTICS

	<u>SSS</u>	<u>CSWS</u>	<u>NOD</u>
Range up to:	400 meters	1000 meters	1500 meters
Magnification:	4 power	7 power	7 power
Field of view:	Approx 10° 171 mils	Approx 5.5° 108 mils	Approx 3° 55 mils
Lens Focus:	4 meters to inf	50 meters to inf	50 meters to inf
Eye piece focus:	adjustable from minus 4 to plus 4 diopters		
Weights:	5.91 lbs	15 lbs	34 lbs
Tripod weight:	-	-	9 lbs
Lengths:	13.86"	24.75"	33"
Widths:	3.35"	6.31"	12.7/8"
Height:	5.52"	7"	14.7" (without tripod)*
Elevation:	-	-	+600 mils to -400 mils
Azimuth:	-	-	0 to 6400 mils
Battery:	6.75 volts, mercury BA 1100U (disposable)		
FSN:	1090-688-9954	1090-911-1370	5850-688-9956

\* Adjustable (approx 4 to 6 feet for large tripod and approx 1 foot for small tripod).

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