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Night Vision Devices

Night Vision Devices (NVDs) give us the capability to see, maneuver, and fight at night. Even as they increase our capabilities, they also have inherent limitations. NVDs, when improperly used, can lead to invalid risk assessments, causing units and crews to attempt movements that are too aggressive for conditions, resulting in unnecessary accidents.

Soldiers want to win and they want to be successful. Commanders and leaders must put soldiers in a position to be successful by employing NVDs routinely and according to established standards. This issue of *Countermeasure* addresses a wide range of subjects pertaining to NVDs, including devices available, NVD limitations, and training strategies in night operations.

Only after we have mastered the use of our night vision equipment, can we say that...**We Own the Night!**

The Official Safety Magazine for Army Ground Risk-Management

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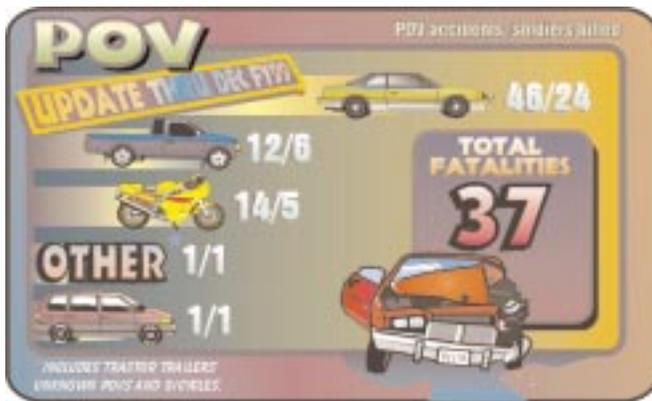
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From the Editor

Have you ever driven your car at night in a heavy rainstorm, wanting to get home, but feeling a little uneasy because of reduced visibility? The windshield wipers just couldn't keep up with the rain. There you were, zipping along at 55 mph, hoping that the road was clear ahead and rationalizing that you could see "well enough" to get to the next exit, or that the rain would stop soon, or that if you kept up your speed, you would "drive out of it."

Well, driving your car in a heavy rainstorm when the windshield wipers are not capable of keeping the windshield clear could be compared to driving with night vision devices (NVDs) in low ambient light or adverse weather conditions – the equipment capabilities can be exceeded by the prevailing conditions.

Night vision devices greatly enhance our ability to see at night, but they're not perfect. Therefore, we must understand the inherent limitations in the NVDs, in our equipment, and in ourselves.

Before I started my research, I thought NVDs were magic. They could work in any conditions without aid from outside sources. **WRONG!** We need to understand that NVDs do not turn night into day. Although they greatly enhance our ability to use the night to our advantage, there are limits as you will see in CW5 Bill Altman's articles, "Things That Go Bump In The Dark" and "NVG Limitations."

I'd like to thank CW5 Altman, Safety Center NVD Systems Manager; Bob Brooks, Safety Center contractor; CECOM's Jay Hanrahan and Susan Weir, and NV/RSTA program managers Glen Nowak and J. Brian Gillespie for their guidance and expertise in creating this issue. ♦

SAFETY FIRST!

Paula Allman

NVD Types and Uses

For our ground forces to be effective on today's battlefield, it is necessary for us to be able to fight and maneuver at night. Night vision devices (NVDs) make this possible by providing our night fighters the ability to see, maneuver, and shoot at night or during periods of reduced visibility, thus increasing our combat effectiveness.

The Army uses two types of NVDs: Image Intensifiers and Thermals

■ **Image-Intensification Devices** are based on light amplification. Image-intensifier systems must have some light to function; they amplify available light 2,000 to 5,000 times.

● **AN/PVS-4 and AN/TVS-5 Weapon Sights.** Both are lightweight, second/third-generation night-vision scopes. Each can be mounted on a variety of weapons or handheld for surveillance purposes.

● **AN/PVS-5** is one of the original NVDs used by individual soldiers. It uses a second-generation image-intensifier tube for combat, combat support, and combat service support operations.

● **AN/PVS-7D** is a lightweight goggle used by individual soldiers. It uses a single, third-generation image-intensifier tube. Its performance is significantly greater than the AN/PVS-5 and is used in combat, combat support, and combat service support operations.

● **AN/PVS-10 Sniper Night Sight (SNS)** is an integrated day/night sight for the M24 sniper rifle. It gives the sniper the capability to acquire and engage targets during low and high ambient light conditions. The system mounts on the M24 and uses the same mil-dot reticle as the existing Leopold day scope. The magnification for day and night operation is 8.5X, and the

system's maximum weight is 4.9 pounds.

● **AN/PVS-14 Monocular Night Vision Device (MNVD)** provides leaders of combat infantry units with a small, lightweight, night-vision device for use in observation and command and control. It interfaces with the AN/PVS-7D head and helmet mount, and the 3X magnifier. It can also be mounted to a small arms rail using a rail grabber.

● **AN/VVS-2 Driver's Night Vision Viewer** is a second/third-generation night-vision scope and provides a closed-hatch night-vision capability in combat vehicles.

● **AN/AVS-6 Aviator's Night-Vision Imaging System (ANVIS)** provides image intensification for helicopter crew members to conduct night missions under minimal ambient light conditions. It is powered using existing aircraft power or a helmet-mounted battery pack.

■ Thermal Programs.

Thermal/forward-looking infrared (FLIR) detectors (sometimes called "sensors") work by sensing the temperature difference between an object and its environment. Thermal/FLIR-detector systems are installed on certain combat vehicles and helicopters.

● **AN/VAS-5 Drivers Vision Enhancer (DVE)** provides drivers of combat and tactical wheeled vehicles unparalleled flexibility to continue day or night operations during most periods of degraded visual conditions caused by smoke, fog, dust, or similar conditions.

● **AN/PAS-13 Thermal Weapon Sight (TWS)** allows soldiers to see deep into the battlefield, increases surveillance and target acquisition range, and penetrates obscurants, day or night. The TWS is a second-generation FLIR system. The TWS family provides a substantial improvement over the image-intensifier night sights currently in use for small arms. ♦

NOTE: To avoid confusion, when we discuss "NVGs," we're referring only to image-intensifier devices; when we use the term "NVDs," we're referring to all devices, including thermals.

Things That Go Bump In The Dark

The improper use of night vision devices (NVDs) has been listed as a contributing factor in seven Class A vehicle accidents over the past 5 years. These accidents have resulted in seven fatalities and eleven injuries, along with millions of dollars in equipment loss and damage.

After careful review of these accident reports, certain key factors surface. Inadequate driver's training is constantly one of the major causal factors noted. We expect our young soldiers to perform at 100 percent proficiency no matter how demanding the environment. All too often, these soldiers have very little training prior to participating in a major training event such as an NTC rotation.

The adage, "Once you learn to ride a bicycle, you never forget," doesn't hold true for driving with NVDs. **Driving with NVDs is a highly perishable skill.** Just because you have all your drivers "qualified," doesn't mean they are mission ready. There is never an assurance that your drivers will not have an accident. Getting them trained and keeping them proficient is the key. The more often you train, the more confidence they will build; thus, the easier and safer it will be to accomplish your mission (not to mention, more efficiently!).

The basic requirements to qualify drivers in NVDs are listed in chapter 8 of AR 600-55, *The Army and Operator Standardization Program (Selection, Training, Testing, and Licensing)*. Prior to conducting night driving training operations, commanders must understand the limitations of each device in order to manage their associated risks. Commanders must develop their driver's training to suit the unit mission essential task list (METL).

FM 21-305, *Manual for the Wheeled Vehicle Driver*, provides useful information/guidelines for night vision goggle (NVG) driving operations.

TC 21-305-2, *Training Program for NVG Operations*, was revised on 4 Sep 98 and contains information that can assist you in establishing an effective training program. TC 21-306 contains procedures for tracked vehicle operators.

Drivers must be qualified and current for each specific type of NVD they are to operate. This must be annotated on the individual's DA Form 348 driver's license and OF 346. Drivers who have not participated in an NVD driving mission during the past 6 months must undergo refresher training in order to maintain or regain proficiency.

Another area that shows up time and again as an accident cause factor is the lack of understanding of the NVD capabilities and limitations.

Let's review some limitations of the most commonly used NVDs. (Also see "NVG Limitations" on page 7.)

The AN/VVS-2 Driver's Night Vision Viewer for track vehicles is a night-vision imaging device. The AN/VVS-2 has significant limitations for detailing differences in terrain, especially depth perception. This may not seem all that important while conducting driver's training at Fort Riley, but what a difference when you get to the NTC for that training rotation.

The limited field of view (FOV) of the AN/VVS-2 is another concern. The normal FOV for a person is about 188 degrees. However, when looking through NVGs, it is reduced to approximately 40 degrees or less. Drivers have to realize this and work with the limited FOV to become comfortable and proficient. Whenever possible, the vehicle commander should use the AN/PVS-7 to assist the driver in clearing obstacles. Driver proficiency can be accomplished by placing command emphasis to ensure repeated usage on a regular training basis.

The last area of concern is operator preventive maintenance checks and

services (PMCS) and operating procedures listed in the TM 11-5855-249-10, *Drivers Night Vision Viewer Operator's Manual*. A clean viewer window and eyepiece are essential for optimum effectiveness. Users must always evaluate the performance of their NVD. If any faults are found that interfere with your ability to perform your mission, the device should not be used and must be turned in for maintenance.

The AN/PVS-7 also has limitations that need to be addressed for successful mission accomplishment. This piece of equipment is used by track vehicle commanders and by wheeled vehicle drivers and commanders, as well as dismounted soldiers.

Like the AN/VVS-2, the AN/PVS-7 has a 40-degree FOV. Using scanning techniques (free viewing) may be best suited for the individual driver and vehicle commander. Done properly, the risk posed by the FOV limitation can be mitigated to a minimum.

A reduction in visual acuity (sharpness of vision) is another problem posed by NVGs. Normal daytime vision is 20/20; average night unaided is worse than 20/200. Subsequently, the best you can expect from NVGs is 20/25 to 20/40. This visual acuity is only possible with a high contrast scene and optimum illumination. The lower the illumination, the more your sharpness of vision will drop. Drivers and vehicle commanders have to take this knowledge

and apply it as needed in order to complete the mission safely.

Although the AN/PVS-7 has better resolution (how well you can see) than the AN/VVS-2, it won't do you much good if they aren't in focus. All users must perform the focusing procedures that are listed in the operator's manual. If these procedures are not used, operators are starting the mission with one strike against them and compromising the safety of everyone in the vehicle, and/or in their path.

Unfortunately, too often there is never enough time to train right the first time, but always enough time to train over again. That, of course, is provided that you are lucky enough not to become just another accident statistic. With proper training and a thorough understanding of your equipment, NVDs become one of the commanders' aces in the hole when it comes to combat multipliers. We must embrace that way of doing business to ensure **THINGS DON'T GO BUMP IN THE DARK!** ♦

Editor's note: For a good review of other areas of concern and consideration with NVDs, refer to February 1996 and October 1997 issues of Countermeasure.

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- Three M3A2 Bradley fighting vehicles drove over a 15-foot cliff and landed upside down. Result: Two soldiers killed and eight injured.
- An M1A1 tank rolled over after embankment gave way during night tactical convoy training. Result: One soldier killed.
- An M977 Cargo HEMMT drove over a gate guard at class IV/V yard. Result: One soldier killed.
- An M966 HMWWV rolled over twice after sliding off narrow road. Result: Two soldiers injured.
- An M1A1 tank main gun struck an M113 APC while conducting a night convoy. Result: One soldier killed and one injured.
- An M35A3 2½-ton truck drove over a dismounted soldier while conducting night convoy operations. Result: One soldier killed.
- An M3A2 Bradley fighting vehicle drove into a 14-foot deep arroyo and overturned. Result: One soldier killed.

NVD Resources

People Sources

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Publication Sources

- **FM 21-305:** Manual for the Wheeled Vehicle Driver, 27 Aug 93
- **STP 11-39E13-SM-TG:** Soldier's Manual/Training Guide, 9 Feb 93
- **TC 21-305-2:** Training Program for NVG Driving Operations, 14 Nov 90
- **TM 11-5855-213-23&P:** Unit and Direct Support Maintenance Manual for Night Vision Sight, Individual Served Weapon, AN/PVS-4, 1 Jun 93
- **TM 11-5855-214-10:** Operator's Manual, Night Vision Sight, Crew Served Weapon, AN/TVS-5, 15 Feb 89
- **TM 11-5855-238-10:** Operator's Manual, NVGs, Ground Use, AN/PVS-5, -5A, -5B, and -5C, 15 May 93
- **TM 11-5855-238-23&P:** Unit and Direct Support Maintenance Manual, NVGs, Ground Use, AN/PVS-5, -5A, -5B, and -5C, 15 Nov 93
- **TM 11-5855-249-10:** Operator's Manual, Viewers, Driver's Night Vision, AN/VVS-2(V)1, -2(V)1A, -2(V)2, -2(V)2A, and -2(V)3, 15 Jan 93
- **TM 11-5855-249-23&P:** Unit and Direct Support Maintenance Manual, Viewers, Driver's Night Vision, AN/VVS-2(V)1, -2(V)1A, -(V)2, -2(V)2A, and 2(V)3, 1 Jun 94
- **TM 11-5855-262-10-1:** Operator's Manual, NVGs, AN/PVS-7A, 15 Feb 89
- **TM 11-5855-262-10-2:** Operator's Manual, NVGs, AN/PVS-7B, 15 Jul 94
- **TM 11-5855-262-23P-1:** Unit and Direct Support Maintenance Manual, NVGs, AN/PVS-7A, 15 Mar 93
- **TM 11-5855-262-23P-2:** Unit and Direct Support Maintenance Manual, NVGs, AN/PVS-7B, 15 Mar 93
- **TM 11-5855-264-14:** Operator's, Aviation Unit, Direct Support, and General Support Maintenance Manual, Test Set, Electronics System, 15 Mar 93
- **TM 11-5855-264-24P:** Aviation Unit, Intermediate Direct Support, and General Support Maintenance Repair Parts and Special Tools List for Test Sets, Electronics System,

TS-3895/UV and TS-3895A/UV,
15 May 92

■ **TM 11-5855-297-12&P:** Operator's and Unit Manual, Aiming Light, Infrared, AN/PAQ-4A, 15 Sep 90

■ **TM 11-5855-299-12&P:** Operator's and Unit Maintenance Manual, Test Set, Electronic Systems, TS-4348/UV, 15 Nov 92

■ **TM 11-5855-302-12&P:** Operator's and Unit Maintenance Manual, AN/PAS-13

Thermal Weapon Sight, 1 Jan 97

■ **TM 11-5855-304-12&P:** Operator's and Unit Maintenance Manual, AN/VAS-5 Driver's Vision Enhancer, 15 Aug 96

■ **TM 11-5855-306-10:** Operator's Manual, Monocular NVD, AN/PVS-14, 30 Dec 97 (advance copies only)

■ **TM 11-5855-306-23&P:** Unit and Direct Support Maintenance Manual, Monocular NVD, AN/PVS-14, 25 Sep 98 ♦

NVG Limitations

The key to training and operating safely and efficiently with night vision goggles (NVGs) is understanding their limitations. The NVGs discussed here work on ambient light amplification (they need some light to function). Their limitations include the following:

■ **Limitation: Reduced field-of-view (FOV).** NVGs cut the normal daytime FOV of approximately 188 degrees to about 40 degrees FOV—a loss of 148 degrees of visual field. **Control:** The user must use individual scanning techniques to make up for this limitation.

■ **Limitation: Reduced visual acuity (sharpness of vision).** The very best vision NVGs can provide is not as good as daytime vision. Normal vision is 20/20; the very best NVGs can provide is 20/25 to 20/40—and even this is possible only with optimum high illumination, correct goggle adjustment, and a high-contrast target. As either illumination or contrast decreases, visual acuity also drops.

Control: Leaders should require crews to slow down in low light and poor visibility. Additionally, provide a solid training program that requires consistent usage in all light and contrast conditions to become and remain proficient.

■ **Limitation: Reduced depth perception and distance estimation ability.** We normally use both monocular (one eye) and binocular (two eyes) vision to pick up cues that enable us to estimate distance and perceive depth. With NVGs, we primarily use monocular cues. For example, when we view side-by-side objects of different sizes through an NVG, the larger one appears to be closer than the smaller.

When we view overlapping objects through an NVG, the one that overlaps—that is, the one in front—seems to be closer. In addition, some objects viewed through NVGs may appear to be further away than they actually are. The principal reason is that we tend to associate loss of detail sharpness with distance. On the other hand, light sources that are not associated with a terrain feature (for example, a light atop a tower) appear to be closer than they actually are. **Control:** Users must be aware of these cues and also that they may tend to overestimate distance and underestimate depth, particularly in low light.

■ **Limitation: Dark adaptation.** The human eye requires time to adapt from day to night vision. That's why people can barely see when they first enter a dark movie theater during the daytime; their eyes need time to adjust—or adapt—to the darkness. So it is with NVGs. Users are basically seeing a dim-day view, so when they take off the NVGs, their eyes need time to adapt to darkness.

Control: The amount of time they need depends on how long the NVGs were used, but most people achieve about 75 percent dark adaptation within 30 seconds of removing the goggles. This is especially important to know in situations where soldiers use NVGs as binoculars by holding them up to their eyes and then taking them down.

To overcome NVG limitations, it is important to train soldiers on those limitations, train them on what will and can be seen through the NVG, and provide them ample opportunities to use this skill. ♦

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Accident Review

Tragedy In The Trenches

A Bradley platoon was participating in a night live-fire exercise as part of a Limited User Test (LUT) when a dismounted soldier positioned in the trench was struck and fatally injured by two 5.56mm rounds.

The LUT was being conducted to evaluate the new M2A3 Bradley Fighting Vehicle (BFV) and reconfiguration of the platoon's dismounted soldiers to a 3-squad, 9-man-per-squad configuration (3x9). Prior training was conducted for the mounted Bradley crews, to include conduct of fire and reticle aim proficiency, as well as new equipment training and advanced trainer proficiency. The dismounted training included individual weapons qualification, squad/dismounted platoon maneuver training, and live-fire exercises. Evaluation had been ongoing for several weeks. The BFV firing tables were used as a baseline for the testing. The platoon had progressed to Bradley

Table XIIB, Platoon Night Qualification, and prepared for the night live-fire exercise. A day, dry rehearsal for the night live fire, to include the troop dismount and occupation of the trench line, was conducted and a night range safety briefing was given.

At the onset of the night live-fire portion of the LUT, the platoon proceeded down range to conduct Bradley Firing Table XIIB live fire. The BFVs made several engagements before reaching the battle position. Once there, the three squads of nine personnel dismounted the BFVs and moved to a tree line to the north. They then moved west along the tree line to a position adjacent to the intended trench, which faced west, down range. The three squads entered the trench with the accident squad entering last and occupied a defensive position. The squad was armed with three M249 squad automatic weapons (SAWs) and six M16A2/203 rifles. Two of the SAW

gunners were equipped with AN/PVS-4 night vision devices (NVDs) and the third was unaided. The rest of the squad was equipped with AN/PVS-7B night vision goggles (NVGs).

The squad leader tactically positioned the dismounts according to the threat, as practiced during the rehearsal.



Mission: Conduct Night Live Fire (From Trench Line)

Hazards

- ❑ Soldiers not having confidence in NVDs
- ❑ Not identifying targets before engaging
- ❑ Sectors of fire not visible
- ❑ Range fan markers not visible

Results

- ❑ 1 Fatality

Controls

- ❑ Train soldiers on NVD use and limitations
- ❑ Positive ID of targets prior to engagement
- ❑ Establish specific individual sectors of fire in compliance with range SOPs and STPs
- ❑ Adequately illuminate range fan limits

Each dismount was told his sector of fire would be 12 o'clock down range. Because of the varying depth of the trench, seven of the nine squad members had to assume semi-prone positions lying on the berm on the forward edge of the trench. The linear design of the trench was slightly jagged, resulting in some dismount positions being slightly forward of others.

While waiting on the targets to be raised, the soldiers were having difficulty focusing their night vision equipment. They also were not able to identify the right range fan marker that was approximately 50 meters to the right front because it was not illuminated. Some squad members had even removed their goggles from their head mounts and used them in the "binocular" mode.

When the first set of targets was raised, they were not seen by the dismounts, so were not fired upon. The targets intended for dismounted fire could be seen by the BFV crews with the aid of their night sights; thus, the BFV crew prompted the dismounted platoon via radio that targets would be appearing. When the second iteration of targets was raised, the BFV crew fired on the targets with their coaxial gun. The dismounted soldiers, observing the BFV's coax tracers, also engaged. During the third firing engagement, the squad safety officer who had been patrolling/observing the engagement from behind the trench, observed tracers firing to the right of the range fan marker. He immediately called a cease-fire, entered the trench, and seized the weapon that appeared to be the source of the tracers.

Results. A dismounted soldier had shifted his body while in the prone position and subsequently became disoriented, and fired several rounds outside of his sector of fire, past the right

range fan marker. Another squad member who had been positioned slightly forward in the trench was struck and fatally injured by the rounds.

Hazards Identified.

- **Soldiers did not have confidence in NVDs.**

- **Targets were not identified before engaging.**

- **Sectors of fire were not visible.**

- **Range fan markers were not visible.**

Controls.

- **Adequate training for use of NVDs.**

Training and additional exposure to NVDs minimize soldier's discomfort in their use as well as increase confidence.

- **Positive identification of targets prior to engagement.** The range safety brief and SOP cited this as a requirement, but many squad members elected to follow tracers as a

method of target orientation.

- **Establish specific individual sectors of fire.** Official Army soldiering guidance, STP 7-11BCHM14.SM-TG, cites the importance of marking the left and right limits of individual sectors of fire. Sector stakes can provide limits for movement, especially during limited visibility. Field expedient methods such as use of rocks, sticks, tent pegs, or ammo magazines provide for good tactical coverage as well as serving as a control measure for the risk of fratricide.

- **Adequately illuminate range fan limits during training exercises.**

Although the range safety SOP cites illumination as a requirement, live-fire training was scheduled and conducted without proper illumination of the trench's right range fan marker. ♦

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NVD proficiency is a "use it or lose it" skill. Don't assume your soldiers are proficient unless they have trained with NVDs recently.

From The Troops

Driving With NVGs

What is the concern?

An analysis of 1986-1996 ground vehicle accidents involving night vision devices reveals that the inability to detect a hazard or obstacle was a factor in 43 percent of these accidents.

Over two-thirds of the accidents were attributable to three categories of terrain and roadway hazards/obstacles: drop-offs - 34 percent, ditches - 23 percent, and rear-end collisions with another vehicle - 11 percent.

Environmental conditions often cited as contributing factors were: dust - 24 percent, blooming due to light sources - 9 percent, and smoke - 8 percent.

Nearly two-thirds (63 percent) of the accidents involving drop-offs (sudden changes in elevation greater than 3 feet in depth) were due to detection errors. The drivers either did not detect the obstacle or detected it directly prior to impact.

Illumination levels also played a role in these accidents. The majority (85.1 percent) of these accidents occurred under low illumination conditions. Clearly, good risk management would involve awareness and consideration of the expected illumination levels.

In an effort to determine why and how these accidents occur, a series of studies addressed the hazards associated with night vision goggle (NVG) use when driving. In one study, it was shown that NVGs have a definite disadvantage when operating in a smoke environment. Some soldiers in the study had difficulty in locating obstacles (objects in roadway), detecting potential hazards (ditches with elevation changes 3 feet or less in depth), and properly navigating the test courses when using AN/PVS-7B NVGs in a smoke environment. Nearly a third of the soldiers reported they were unable to see and felt they could not safely navigate due to thick smoke coverage.

In another study, the ability of drivers to detect drop-offs using AN/PVS-7B NVGs was evaluated. It was concluded that some drivers using NVGs would have been unable to detect the drop-offs in time to stop a Bradley Fighting Vehicle moving at 20 mph, even though the lighting conditions were good and the drivers were aware of and familiar with the drop-offs.

Further, the distance at which a drop-off could be detected was found to depend on the surrounding environment. Drop-offs occurring in natural surroundings (those typical of cross-country missions) had shorter detection distances than those occurring near man-made surroundings (those containing bridge abutments, buildings, paved roads, etc.). Shorter detection distances give the driver less time to identify and respond to the hazard. This indicates that drivers and commanders need to exercise greater caution and enhanced awareness when driving in natural surroundings.

What to do about it

It has been found that NVG skills are highly perishable. Soldiers need continuous NVG training, especially in perceptual and decision skills. The proper emphasis on training and key elements of driving with NVGs will allow the commander to practice risk management and enhance the safety and readiness of the troops.

To manage risks associated with NVG driving—

Drivers should:

- Have adequate training and recent experience using NVGs while driving.
- Understand the adjustments to and functions of the NVGs (focusing and interpupillary adjustment).
- Know the NVGs' capabilities and limitations (performance under smoke or zero moon conditions).
- Be aware of potential terrain hazards

(drop-offs, ditches, personnel, etc.). Either perform a daytime reconnaissance of the area, or review terrain hazards on a map of the area during the planning stages of the mission.

- Realize which visual cues indicate terrain hazards.
- Use ground guides when in unfamiliar territory.
- Know how to respond to emergency situations.

Unit leaders should:

- Assess risks realistically and plan controls to reduce the hazards.
- Train drivers on night vision techniques, sensory illusions at night, and the capabilities and limitations of NVDs.
- Ensure that drivers are fully trained and qualified on their vehicles.
- Ensure that NVDs have been properly serviced and are in good working order.
- Emphasize the terrain hazards and the impact of low light levels on the equipment and personnel.

- Stress the dangers of overconfidence in either equipment or personnel ability to operate under adverse conditions.

Closing thoughts

Successful management of the risks associated with using NVGs for night driving can be accomplished through the combination of a thorough assessment of those risks, effective training, and involvement of unit leaders. This will in turn result in the increased safety of soldiers during night operations. ♦

Editor's note: The contents of this article are the expressed opinions and views of the author and do not necessarily represent those of the U.S. Army Safety Center or the U.S. Army.

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Safety of Use Messages

The following is a list of selected safety of use messages (SOUMs) issued by Army TACOM-Warren for 4QFY98 and 1QFY99. Complete copies are available from the Army Electronic Product Support Bulletin Board website at www-aeps.ria.army.mil

- AMSTA-IM-O, 211154Z Aug 98, subject: SOUM, TACOM-WRN No. 98-13, Spreader, lifting, front cont, 20 ft., LIN U12203, Linefast Corp., NSNs 3990-00-296-9398 and 3990-01-128-0089, and isometrics, NSN 3990-01-258-2010. Summary: Units are reminded that the maximum rated lift capacity for the subject spreader bars remains 44,800 pounds, as marked on the frames. POC: Wayne Kraenzlein, DSN 786-8201 (810-574-8021), kraenzlw@cc.tacom.army.mil
- AMSTA-IM-O, 101227Z Aug 98, subject: SOUM, TACOM-WRN No. 98-12, "Technical" Deadlining of the lifting capability for the Heavy Equipment Recovery Combat Utility Lift and Evacuation System (HERCULES), NSN 2350-01-390-4683, model M88A2, LIN: R50885. Summary: Due to the discovery of

casting cracks in the shoe tree, HERCULES crew members will not use the boom for lifting any load under any circumstances. POC: Ricky Mitchell, DSN 786-7571 (810-574-7571), mitchelr@cc.tacom.army.mil

- AMSTA-IM-O, 191400Z Oct 98, subject: SOUM, TACOM-WRN No. 99-01, "Operational" M1000 Heavy Equipment Transporter System (HETS) Semitrailer, NSN 2330-01-303-8832, LIN S70859. Summary: Users are not authorized to load/haul any Abrams tank with the mine-clearing blade, attached or unattached, on the M1000 HET semitrailer. The mine-clearing blade must be removed from the tank and transported separately. POC: Casey Pardo, DSN 786-5795 (810-574-5795), pardoc@tacom.army.mil ♦

Info Tech Corner

Info of Special Interest To All Safety Officers

Year 2000 compliant accident data system almost ready

Over the past 18 months, we at the Safety Center have been working hard to replace the accident database with a new system that is year-2000 (Y2K) compliant. Our primary focus is to improve your ability to get the information you need. The new system is expected to be operational by 2 February 1999. However, this will involve taking the old Safety Center database server (Army Safety Management Information System [ASMIS]) off-line and bringing the new database server on-line. The result is

that, as of 2 February 1999, you will no longer have access to the Safety Center database using the ASMIS Retrieval and Processing System (ARPS).

You will be able to access the new accident database through a series of user tools placed on the Risk Management Information System (RMIS) at <http://rmis.army.mil>. These tools, which functionally represent known information requests to the Safety Center, will be located under a button called "Database." We realize that there will be additional information requirements not currently covered by this initial set of tools. As a result, your feedback is now more important than ever.

If you have a good idea, or have a problem with our web sites or can't find what you need, or you're just totally confused—all you have to do is e-mail us at helpdesk@safety.army.mil or call DSN 558-1390 (334-255-1390) and let us know what you need. Ms. Reta Dyson or Mr. Junior Kelley will try to find a solution to your problem. If you have problems getting an RMIS password, contact Ms. Jewnita Clark at DSN 558-3889.

If it has been a while since you visited us—or if you never have—it's time to take a look for yourself. The user tools should be completed by the time you read this, so pay us a visit at <http://rmis.army.mil> or <http://safety.army.mil> and keep up to date on what's happening in Army safety. ♦

Keep in touch. We're constantly updating our site so we can meet your needs and expectations.



You Can Reach Us At

<http://safety.army.mil> or <http://rmis.army.mil>
For Help Desk, Call DSN 558-1390 or 334-255-1390