

APPENDIX K

NIGHT OPERATIONS

The ability to fight at night is a necessary skill for infantry forces, and it is a combat multiplier. Infantry forces use night skills to gain a tactical and psychological advantage. Night operations do not depend on technology for success. The absence of night vision devices does not prevent commanders from planning and executing night operations. For LRSU, night operations are normal.

This appendix is an overview of night fighting techniques. Psychological, physiological, and physical effects of night combat are discussed. Specifics on how to maintain direction, control, and surprise during night operations are also discussed. Although the primary emphasis is on night operations, this information also applies to other limited visibility operations (fog, rain, snow, and sandstorms).

K-1. NIGHT VISION

Vision at night is different than during the day. At night, the eye uses spiral eye cells called rods. Rods cannot differentiate color, and are easily blinded when exposed to light. This creates a central blind spot, which causes larger objects to be missed as distances increase.

a. **Protecting Night Vision.** While working and performing tasks in daylight, the exposure to light directly affects night vision. Repeated exposure to bright sunlight has an increasingly adverse effect on dark adaptation. Exposure to intense sunlight for two to five hours causes a definite decrease in visual sensitivity, which can persist for as long as five hours. This effect can be intensified by reflective surfaces such as sand and snow. At the same time, the rate of dark adaptation and the degree of night vision capability will be decreased. Since these effects are cumulative and may persist for several days, military neutral density (N-15) sunglasses or equivalent filter lenses should be used in bright sunlight when night operations are anticipated.

b. **Night Vision Scanning.** Dark adaptation or night vision is only the first step toward maximizing the ability to see at night. Night vision scanning enables soldiers to overcome many of the physiological limitations of their eyes and reduce the visual illusions that so often confuse them. The technique involves scanning from right to left or from left to right using a slow, regular scanning movement (Figure K-1, page K-2). Although both day and night searches use scanning movements, at night soldiers must avoid looking directly at a faintly visible object when trying to confirm its presence.

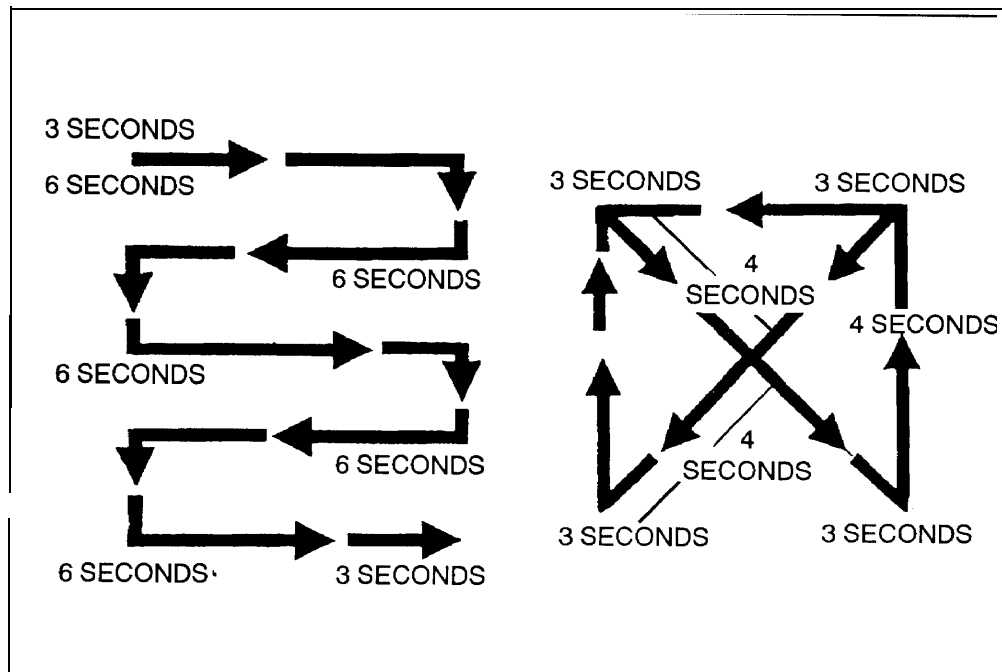


Figure K-1. Typical scanning patterns.

c. **Off-Center Vision.** Viewing an object using central vision during daylight poses no limitation, but this technique is ineffective at night. This is due to the night blind spot that exists during low illumination. To compensate for this limitation, soldiers use off-center vision. This technique requires looking 10 degrees above, below, or to either side of an object rather than directly at it (Figure K-2). This allows the peripheral vision to remain in contact with an object.

d. **Dark Adaptation.** Dark adaptation is the process by which the eyes increase their sensitivity to low levels of light. Soldiers adapt to the darkness at varying degrees and rates. During the first 30 minutes in a dark environment, the eye sensitivity increases roughly 10,000 times, but not much further after that time.

(1) Dark adaptation is affected by exposure to bright lights such as matches, flashlights, flares, and vehicle headlights. Full recovery from this exposure may take up to 45 minutes.

(2) Night vision goggles impede dark adaptation. However, if a soldier adapts to the dark before donning the goggles, he gains full dark adaptation in about two minutes after removing them.

(3) Color perception decreases during night operations. Light and dark colors may be distinguished depending on the intensity of the reflected light.

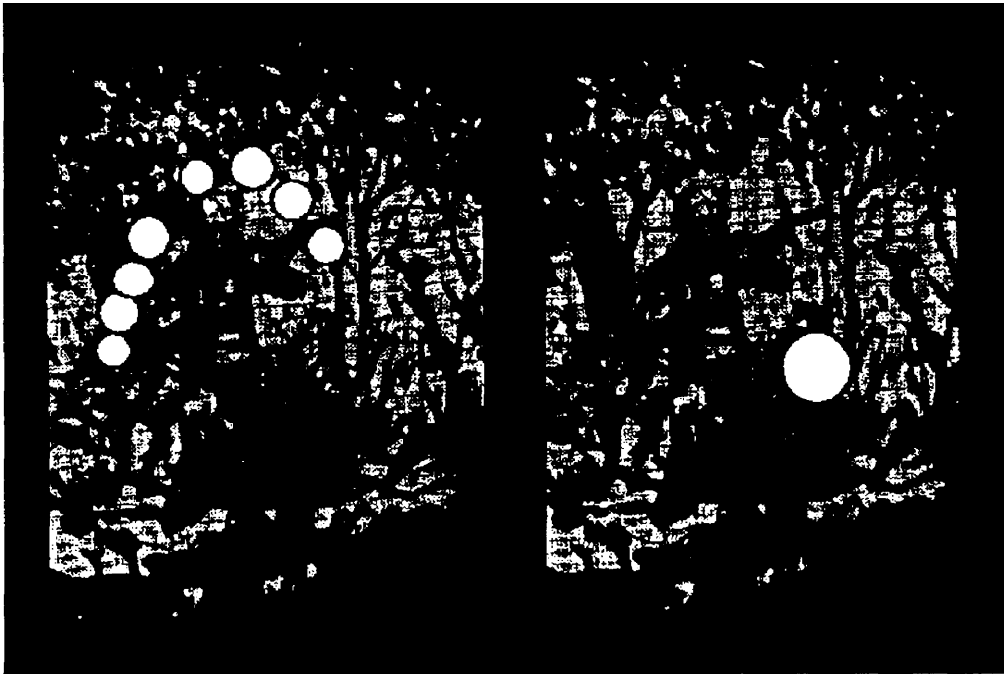


Figure K-2. Off center viewing technique.

(4) Visual activity is also reduced. Since visual sharpness during night operations is one-seventh of what it is during the day, soldiers can only see large, bulky objects.

e. **Bleach-Out Effect.** Even when off-center viewing is practiced, the image of an object viewed longer than two to three seconds tends to bleach out and become one solid tone. As a result, the object is no longer visible and can produce a potentially unsafe operating condition. To overcome this condition, the soldier must be aware of this phenomenon and avoid looking at an object longer than two to three seconds. By shifting his eyes from one off-center point to another, he can continue to pick up the object in his peripheral field of vision.

f. **Shape or Silhouette.** Objects must be identified by their shape or silhouette. Familiarity with the architectural design of structures common to the area of operations determines one's success using this technique. For example, the silhouette of a building with a high roof and a steeple can be recognized in the United States as a church, while churches in other parts of the world may have entirely different architecture.

g. **Light Sources and Distances.** Table K-1, page K-4, shows the distances that light sources can be seen at night with the naked eye.

SOURCES	DISTANCES
Vehicle headlights	4 to 8 kilometers
Muzzle flashes from single cannons	4 to 5 kilometers
Muzzle flashes from small-arms weapons	1.5 to 2 kilometers
Bonfire	6 to 8 kilometers
Flashlight	Up to 2 kilometers
Lighted match	Up to 1.5 kilometers
Lighted cigarette	0.5 to 0.8 kilometers

Table K-1. Light sources and distances.

NOTE: For observation from the air, these distances can increase two to three times.

K-2. HEARING

A soldier's hearing becomes more acute at night. Several factors contribute to this: increased concentration; sound travels farther in colder, moister air; and less background noise. Practice and training help overcome a soldier's fear in what he hears at night. Training enables him to discriminate multiple sounds, faint sounds, and sound source directions. Table K-2 shows the distances that sounds can be heard at night.

SOURCES	DISTANCES
Cannon shot	Up to 15 kilometers
Single shot from a rifle	2 to 3 kilomeyers
Automatic weapons fire	3 to 4 kilometers
Tank movement On a dirt road On a highway	Up to 1.2 kilometers 3 to 4 kilometers
Motor vehicle movement On a dirt road On a highway	Up to 500 kilometers Up to 1 kilometers

Table K-2. Sounds and distances.

SOURCES	DISTANCES
Movement of troops on foot On a dirt road On a highway	Up to 300 meters Up to 600 meters
Small-arms weapons loading	Up to 500 meters
Metal on metal	Up to 300 meters
Conversation of a few men	Up to 300 meters
Steps of a single man	Up to 40 meters
Axe blow, sound of a saw	Up to 500 meters
Blows of shovels and pickaxes	Up to 1,000 meters
Screams	Up to 1,500 meters
Oars on water	Up to 2,000 meters

Table K-2. Sounds and distances (continued).

K-3. SMELL

Smell is the soldier's most unused sense. Only about two percent of its potential is used. The enemy's diet usually varies from that of US soldiers. Different diets produce different characteristic human odors. People who eat a meat diet have a different body odor than people who eat a vegetarian diet. Once a soldier is accustomed to the enemy's characteristic odor, the odor is easy to detect and differentiate at night. Practice improves skill and confidence. Sensing odors at night can be improved by facing into the wind at a 45-degree angle. The soldier should relax, breathe normally, take sharp sniffs, think about specific odors, and concentrate. Table K-3 shows the distance at which odors can be sensed.

SOURCES	DISTANCES
Diesel fuel	Up to 500 meters
Cigarette smoke	Up to 150 meters
Heat tab	Up to 300 meters

Table K-3. Odor sources and distances.

K-4. FATIGUE

Fatigue is the result of too much work with too little sleep. It has a negative impact on a unit's capabilities in a high stress situation. Fatigue can be avoided in most cases. A work-rest schedule ensures recovery time so that a unit's effectiveness is maintained. The following are some techniques leaders can use to minimize fatigue.

- a. A four-hour-on, four-hour-off schedule works well. Two hours on and four hours off works well in bad weather. Other schedules may be just as good. No one schedule suits all soldiers, but a specific schedule might work best for most of the soldiers in a certain team. The leader tries different schedules to find which one works best.
- b. Leaders must be sure soldiers sleep or rest during part of each off-shift period.
- c. Cross-trained soldiers can rotate through various duties to reduce errors.
- d. Leaders should have two soldiers for each job requiring discrimination factors, such as OP procedures or writing and encrypting messages.
- e. Order of priority of sleep should be decided in terms of seriousness of errors, complexity of tasks, and tedium of duties. For example, team leaders and RATELOs might be rated priority 1-2 in this system. So, if someone has to miss sleep to check the OP, the team leader may make one check, his assistant two checks, and an observer three checks. The team leader gets the most sleep, since he makes the most serious decisions and processes the most complex information.
- f. Some soldiers are more efficient early in their awake cycle; others later on. Leaders try to capitalize on the decision makers' best times for their critical task (this should be planned).

CAUTION

ALTHOUGH NIGHT VISION DEVICES CAN INCREASE NIGHT VISION, THEY ALSO DEGRADE THE OTHER SENSES, BECAUSE OF THE CONCENTRATION REQUIRED TO USE THE DEVICE. LEADERS SHOULD PREPARE FOR NIGHT OPERATIONS BY MAKING THE MOST OF ALL THE SENSES. ON CERTAIN OPERATIONS, THIS MAY REQUIRE THAT SOME SOLDIERS NOT USE NIGHT VISION DEVICES.

K-5. ROUTE SELECTION

The leader determines the route used for night movement based on METT-T. Since more than one route may satisfy the requirements for METT-T, leaders select the one that offers ease of navigation. Night travel is strenuous, often done when soldiers are tired. This adds to physical and

psychological stress. Ease of navigation contributes both to maintaining direction and control.

a. The selected route is further analyzed using the factors of observation and fields of fire, avenues of approach, key terrain, obstacles, and cover and concealment (OAKOC). METT-T may make one of these factors more critical, such as terrain, cover, or avenues of approach.

b. In analyzing the route, the leader divides it into segments or legs. Establishing legs helps to maintain control. Each leg begins and ends with a change in direction or a prominent terrain feature. The location where the leg begins is a checkpoint. Checkpoints provide a sequential series of points to use for orientation and control. As before, each leg is analyzed using OAKOC. OAKOC helps determine probable hasty ambush sites, likely areas the enemy may use for movement, and where observation may improve.

c. An additional consideration is given to identifying features on the far side of each checkpoint. This feature acts as a catchpoint in case the checkpoint is missed. The catchpoint provides a quick and easy way to reorient movement. Linear features (such as a river, road, or ridge) are the best features to use as catchpoints.

d. The leader makes every effort to conduct a reconnaissance of the route before moving the unit. (The ideal is both a day and night reconnaissance.) As the reconnaissance is conducted, aids for orientation are confirmed, adjusted, or added. Terrain features (hills, cliffs, rivers, ridges, draws) and man-made features (towers, buildings, bridges, and roads) are all aids to navigation. Other options for the leader are ground surveillance radar, wire, illumination rounds, night vision devices, and machine gun tracer fire. When using mortar illumination rounds or tracer fire as position locators, the fire patterns are planned so they can be seen.

e. A final ingredient is the reorientation plan. Reorientation is planned throughout the movement; checkpoints, catchpoints, and position locators are aids. Nevertheless, units do get lost. Therefore, leaders must plan on how to recover, reorient, and complete the mission. They plan for this contingency during the reconnaissance. Leaders should add extra checkpoints if necessary. They use distant terrain features for resection. Leaders plan to resection off indirect fire on known locations. By planning on how to react if the unit becomes lost, the effects of becoming lost are diminished.

K-6. NIGHT WALKING

Leaders must train their units to move silently. Night movement requires the use of different muscles than day movement. Therefore, soldiers must practice moving at night.

a. Walking at night places more strain and exertion on the muscles of the thighs and buttocks as opposed to the calf muscles used for daylight travel. Night movement requires that these muscles become accustomed to taking short careful steps. The object is to make cross-terrain travel as natural as walking along a sidewalk.

b. Night walking proficiency is gained through practice. A soldier begins by looking ahead, then slowly lifts his right foot about knee high. Balancing on his left foot, he eases his right foot forward to feel for twigs and trip wires. He keeps his toes pointed downward. His foot should touch the ground about 6 inches to the front. As his toes come to rest, the soldier feels for the ground with the outside of the toes of his boot. Then, he settles his foot on the ground. As this step is taken, he uses his boot to feel for twigs and loose rocks. Confident of solid, quiet footing, the soldier slowly moves his weight forward, hesitates, then begins lifting his left foot. The process is repeated with his left foot. This method of balanced, smooth walking at night reduces chances of tripping over roots and rocks and reduces noise. Soldiers conditioned to move at night, using the larger muscle groups of their legs, can travel farther with less fatigue.

c. Crossing fords and streams requires extensive team-level training. While crossing these obstacles, security must be established. To cross the ford, the soldier slips silently into the water, maintains footing, and stays alert. He begins crossing by sliding his lead foot forward and dragging his rear foot as if shuffling forward. This maintains balance and prevents being knocked over by the current. When all personnel are across, the leader takes a head count, and the team moves out.

K-7. SIGNALS

Communication at night calls for the leader to use different methods than during daylight. For instance, arm-and-hand signals used during the day may not be visible during darkness. Signals are used to pass information, identify locations, control formations, or initiate activity. The key to tactical communications is simplicity, understanding, and practice. Signals should be as simple as possible to avoid confusion. Leaders should also ensure that soldiers understand and practice each basic signal and its alternate (if necessary).

a. The most common signals relate to the senses: hearing, feeling, and seeing. Audio signals include radio, wire, telephones, messengers, and

grating or clicking of objects together. Messengers should carry written messages to avoid confusion and misinterpretation. When this is not possible, leaders ensure the messenger understands the message by having him repeat it word for word.

b. Oral communication at night should be whispered. To do this, the soldier takes a normal breath, exhales half of it, and then whispers into the other person's ear using the remainder of his breath.

c. When using the radio and telephone at night, operators take precautions. They lower the volume as low as practical. They use headphones or earphones to reduce unnecessary noise. They know the possibility of loud static. They use signals such as breaking squelch a specified number of times. They know that noise travels farther at night than during the day.

d. Visual signals are alternatives to audio signals. These signals may be active or passive and include a wide range of alternatives. Visual signals must be noticed and recognized.

(1) Some passive signals are—

- Sticks indicating direction.
- Light-color paint.
- Tape.
- Rock formations.
- Markings on the ground.
- Powder.

(2) Active signals include—

- Flares.
- Flashlights.
- Illumination rounds (M203, mortar, artillery).
- Chemical lights.
- Infrared strobe lights.
- Strobe lights.
- PVS-5/7 night vision device (infrared light).
- Burning fuel (saturated sand in a can).
- Luminous tape or compass dial.

(3) These signals can be used to identify a critical trail junction, mark a rally or rendezvous point, mark caches, or report that a danger area is clear. White powder can be used to indicate direction at a confusing trail

intersection. A flashlight with a blue filter (with an X cut out of the filter) can signal all clear to a unit crossing a danger area. The possibilities are endless; but, the leader ensures that each signal used is understood by each soldier in the team.

e. The last type of signal is the sense of feel. Soldiers may use wire, string, or rope to communicate without fear of disclosing their positions. This may be used in the hide or surveillance position. The wire is usually loosely secured to an arm or leg. Using prearranged signals, information is relayed from one person to another. Two pulls on the wire may mean a ground-mounted force approaching, while three pulls may indicate a convoy.

f. Regardless of the type of signal used, it must be simple, easy to understand, and practiced. Signals at night aid in control, enhance security, and support surprise. The leader plans the type of signals based on the unit's activity and desired results. He briefs the soldiers and has them practice the signals.

K-8. TARGET DETECTION

Movement at night and successful target engagement depend on knowing the enemy—how he attacks, defends, and uses terrain. Studying enemy techniques and the pattern he establishes assists in target detection at night. Target detection at night requires patience, attention to detail, and practice. Nature provides an endless array of patterns. Man invariably disturbs them or alters them so they are detectable. Sensing the enemy at night requires leaders and soldiers who are patient, confident, and calm.

a. Patience and confidence are critical for effective target sensing at night. While moving through an area, soldiers must think patterns. They look calmly and methodically through the area; they do not focus on the surface alone, but on patterns, noticing straight lines, strange patterns, and light variations.

b. The team looks for sentries or positions at the entrances to draws, overlooking bridges or obstacles, and on the military crest of prominent terrain (used for maximum observation). They look for supporting positions. Soldiers must keep in mind the range distances for supporting weapons, night vision devices, and line-of-sight observation. They search thoroughly for enemy positions and other indications of enemy activity.

c. Soldiers should use their senses when trying to detect the enemy. Hearing and smelling are particularly important. Other indicators of enemy activity are displacement, weathering, littering, and camouflage.

(1) *Sounds*. A soldier places an ear on the ground or on a stick driven 6 inches into the ground. Since the ground is denser than the air, sounds

travel greater distances, though it is difficult to determine direction. Rain and wind mask sounds. Rain causes soldiers to seek shelter in static positions or, if moving, to put ear flaps down. Both actions degrade their ability to hear someone stalking them.

(2) *Odor*. Odors may indicate enemy activity. Odors float downhill on cool, night air and rise on warm, morning air.

(3) *Displacement*. Soldiers check for stones, leaves, or logs that have been displaced. The undersides of these objects are usually darker in color and damp. Crumbled rocks leave lighter colored faces and chips. At night, a flashlight is needed to detect these indicators, so security must be placed well out. If an infrared source is used, broken and crushed vegetation give off a different signature than growing vegetation.

(4) *Weathering*. This is difficult to determine at night without light and experience. This indicator is the change in a “sign” due to the effects of the weather. Its primary value is to measure the age of a sign (new or old).

(5) *Littering*. This represents previous unit locations and whether the soldiers were distracted or undisciplined. Litter may indicate the enemy unit’s state of supply and morale. Soldiers must watch for booby traps left in the litter.

(6) *Camouflage*. Straight lines are rare in nature. Soldiers watch for them. Soldiers identify contrast in color and tone and unnatural vegetation, such as green leaves among dead branches. An infrared source helps detect cut foliage.

K-9. MOVEMENT

Team leaders determine the best formation and movement techniques based on METT-T. The file is often the best formation for night movement. It makes control easier and provides greater speed when moving in dense terrain. One liability may be the inability to mass fires to the front. However, in most instances, the advantages of the file outweigh the disadvantages. Guidelines that aid in movement control and security include—

- Soldiers must be close enough to touch the soldier in front.
- Soldiers do not move unless told to do so.
- Leaders do the talking.
- Leaders position themselves far enough forward to make timely decisions that eliminate confusion.