FM 20-3

CAMOUFLAGE, CONCEALMENT, AND DECOYS

Headquarters,
Department of the Army

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.

Field Manual
No. 20-3

Headquarters
Department of the Army
Washington, DC, 30 August 1999

FM 20-3

CAMOUFLAGE, CONCEALMENT, AND DECOYS

TABLE OF CONTENTS

*This publication supersedes FM 20-3, 14 November 1990.

Preface

This field manual (FM) is intended to help company-level leaders understand the principles and techniques of camouflage, concealment, and decoys (CCD). To remain viable, all units must apply CCD to personnel and equipment. Ignoring a threat's ability to detect friendly operations on the battlefield is shortsighted and dangerous. Friendly units enhance their survivability capabilities if they are well versed in CCD principles and techniques.

CCD is equal in importance to marksmanship, maneuver, and mission. It is an integral part of a soldier's duty. CCD encompasses individual and unit efforts such as movement, light, and noise discipline; litter control; dispersal; and deception operations. Each soldier's actions must contribute to the unit's overall CCD posture to maximize effectiveness.

Increased survivability is the goal of a CCD plan. A unit commander must encourage each soldier to think of survivability and CCD as synonymous terms. Training soldiers to recognize this correlation instills a greater appreciation of CCD values.

A metric conversion chart is provided in *Appendix A*.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Commandant, United States Army Engineer School (USAES), ATTN: ATSE-DOT-DD, Fort Leonard Wood, Missouri 65473-6650.

This publication implements Standardization Agreement (STANAG) 2931, *Orders for the Camouflage of the Red Cross and Red Crescent on Land in Tactical Operations*.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

Chapter 1

Basics

CCD is the use of materials and techniques to hide, blend, disguise, decoy, or disrupt the appearance of military targets and/or their backgrounds. CCD helps prevent an enemy from detecting or identifying friendly troops, equipment, activities, or installations. Properly designed CCD techniques take advantage of the immediate environment and natural and artificial materials. One of the imperatives of current military doctrine is to conserve friendly strength for decisive action. Such conservation is aided through sound operations security (OPSEC) and protection from attack. Protection includes all actions that make soldiers, equipment, and units difficult to locate.

DOCTRINAL CONSIDERATIONS

1-1. CCD degrades the effectiveness of enemy reconnaissance, surveillance, and target-acquisition (RSTA) capabilities. Skilled observers and sophisticated sensors can be defeated by obscuring telltale signs (signatures) of units on the battlefield. Preventing detection impairs enemy efforts to assess friendly operational patterns, functions, and capabilities.

1-2. CCD enhances friendly survivability by reducing an enemy's ability to detect, identify, and engage friendly elements. Survivability encompasses all actions taken to conserve personnel, facilities, and supplies from the effects of enemy weapons and actions. Survivability techniques include using physical measures such as fighting and protective positions; nuclear, biological, chemical (NBC) equipment; and armor. These actions include interrelated tactical countermeasures such as dispersion, movement techniques, OPSEC, communications security (COMSEC), CCD, and smoke operations (a form of CCD). Improved survivability from CCD is not restricted to combat operations. Benefits are also derived by denying an enemy the collection of information about friendly forces during peacetime.

1-3. Deception helps mask the real intent of primary combat operations and aids in achieving surprise. Deception countermeasures can delay effective enemy reaction by disguising information about friendly intentions, capabilities, objectives, and locations of vulnerable units and facilities. Conversely, intentionally poor CCD can project misleading information about friendly operations. Successful tactical deception depends on stringent OPSEC.

1-4. Smoke and obscurants are effective CCD tools and greatly enhance the effectiveness of other traditionally passive CCD techniques. Smoke and obscurants can change battlefield dynamics by blocking or degrading the spectral bands used by an enemy's target-acquisition and weapons systems. More recently developed obscurants are now able to degrade nonvisual detection systems such as thermal infrared (IR) imaging

systems, selected radar systems, and laser systems. (See FM 3-50 for more information on planning smoke operations.)

RESPONSIBILITIES

1-5. Each soldier is responsible for camouflaging and concealing himself and his equipment. Practicing good CCD techniques lessens a soldier's probability of becoming a target. Additionally, a thorough knowledge of CCD and its guiding principles allows a soldier to easily recognize CCD as employed by an enemy.

1-6. A commander is responsible for CCD of his unit, and noncommissioned officers (NCOs) supervise well-disciplined soldiers in executing CCD. They use established standing operating procedures (SOPs) and battle drills to guide their efforts. CCD is a combat multiplier that should be exploited to the fullest extent.

1-7. An engineer is a battlefield expert on CCD. He integrates CCD into higher unit operations and advises commanders on all aspects of CCD employment as it relates to a unit's current mission.

PRIORITIES

1-8. Every soldier and military unit has an inherent mission of self-protection, and they should use all CCD means available. However, CCD countermeasures have become more complicated due to advancing technology. Commanders must recognize that advanced technologies have—

- Enhanced the performance of enemy recon and surveillance equipment.
- Increased an enemy's ability to use electromagnetic (EM) signature analysis for detecting friendly units.
- Reduced the time available to apply CCD because units must perform nearly all aspects of battlefield operations at an increased speed.

1-9. When time, camouflage materials, or other resources are insufficient to provide adequate support to units, commanders must prioritize CCD operations. Considerations for establishing these priorities involve analyzing the mission, enemy, terrain, weather, troops, time available, and civilian considerations (METT-TC). The following sets forth a METT-TC methodology to help determine CCD priorities:

- **Mission.** The mission is always the first and most important consideration. CCD efforts must enhance the mission but not be so elaborate that they hinder a unit's ability to accomplish the mission.
- **Enemy.** An enemy's RSTA capabilities often influence the camouflage materials and CCD techniques needed to support a unit's mission. Before beginning a

mission, conduct an intelligence analysis to identify the enemy's RSTA capabilities.

- **Terrain and weather.** The battlefield terrain generally dictates what CCD techniques and materials are necessary. Different terrain types or background environments (urban, mountain, forest, plains, desert, arctic) require specific CCD techniques. (See *Chapter 7* for more information.)

- **Troops.** Friendly troops must be well trained in CCD techniques that apply to their mission, unit, and equipment. A change in the environment or the mission often requires additional training on effective techniques. Leaders must also consider the alertness of troops. Careless CCD efforts are ineffective and may disclose a unit's location, degrade its survivability, and hamper its mission accomplishment. Intelligence analysis should address the relative detectability of friendly equipment and the target signatures that unit elements normally project.

- **Time.** Time is often a critical consideration. Elaborate CCD may not be practical in all tactical situations. The type and amount of CCD needed are impacted by the time a unit occupies a given area, the time available to employ CCD countermeasures, and the time necessary to remove and reemploy camouflage during unit relocation. Units should continue to improve and perfect CCD measures as time allows.

- **Civilian considerations.** From conflict to war and from tactical to strategic, civilians in the area of operation (AO) may be active or passive collectors of information. Commanders and their staffs should manage this collection capability to benefit the command and the mission.

TRAINING

1-10. CCD training must be included in every field exercise. Soldiers must be aware that an enemy can detect, identify, and acquire targets by using resources outside the visual portion of the EM spectrum.

INDIVIDUAL

1-11. Each member of the unit must acquire and maintain critical CCD skills. These include the ability to analyze and use terrain effectively; to select an individual site properly; and to hide, blend, disguise, disrupt, and decoy key signatures using natural and artificial materials.

CAUTION

Ensure that local environmental considerations are addressed before cutting live vegetation or foliage in training areas.

UNIT

1-12. Unit CCD training refines individual and leader skills, introduces the element of team coordination, and contributes to tactical realism. If CCD is to conserve friendly strength, it must be practiced with the highest degree of discipline. The deployment and teardown of camouflage; light, noise, and communications discipline; and signal security must be practiced and evaluated in an integrated mission-training environment. CCD proficiency is developed through practicing and incorporating lessons learned from exercises and operations. A unit must incorporate CCD (who, what, where, when, and how) into its tactical standing operating procedure (TACSOP). (*Appendix B* provides additional guidance on integrating CCD into a unit's field TACSOP.) Generally, CCD is additive and synergistic with other defensive measures. CCD enhances unit survivability and increases the likelihood of mission success. A unit that is well trained in CCD operations more easily recognizes CCD as employed by an enemy, and this recognition enhances a unit's lethality.

EVALUATION

1-13. CCD training should be realistic and integrated with a unit's training evaluations. Employ the following techniques to enhance training evaluations:

- Have small-unit leaders evaluate their unit's CCD efforts from an enemy's viewpoint. How a position looks from a few meters away is probably of little importance. Evaluators should consider the following:
  - Could an approaching enemy detect and place aimed fire on the position?
  - From what distance can an enemy detect the position?
  - Which CCD principle was ignored that allowed detection?
  - Which CCD technique increased the possibility of detection?
- Use binoculars or night-vision or thermal devices, when possible, to show a unit how it would appear to an enemy.
- Use photographs and videotapes, if available, of a unit's deployments and positions as a method of self-evaluation.
- Incorporate ground-surveillance-radar (GSR) teams in training when possible. Let the troops know how GSR works and have them try to defeat it.
- Request aerial multispectral (visual, IR, radar) imagery of friendly unit positions. This imagery shows how positions appear to enemy aerial recon. Unit leaders should try to obtain copies of opposing forces (OPFOR) cockpit heads-up display (HUD) or videotapes, which are excellent assessment tools for determining a unit's detectability from an enemy's perspective. Another valuable assessment tool is the overhead imagery of a unit's actions and positions. Overhead imagery is often difficult to obtain; but if a unit is participating in a large-scale exercise or

deployment, the imagery probably exists and can be accessed through the unit's intelligence channels.

- Use OPFOR to make training more realistic. Supporting aviation in an OPFOR role also helps. When possible, allow the OPFOR to participate in the after-action review (AAR) following each mission. The unit should determine what factors enabled the OPFOR to locate, identify, and engage the unit and what the unit could have done to reduce its detectability.

OTHER CONSIDERATIONS

1-14. Warfare often results in personnel losses from fratricide. Fratricide compels commanders to consider CCD's effect on unit recognition by friendly troops.

1-15. Army policy prescribes that camouflage aids be built into equipment and supplies as much as possible. Battle-dress uniforms (BDUs), paint, Lightweight Camouflage Screen systems (LCSSs), and decoys help achieve effective camouflage. These aids are effective only if properly integrated into an overall CCD plan that uses natural materials and terrain. During training exercises, ensure that cutting vegetation or foliage does not adversely effect the natural environment (coordinate with local authorities). CCD aids should not interfere with the battlefield performance of soldiers or equipment or the installations that they are designed to protect. (See *Appendix C* for more information on CSSs.)

1-16. When employed correctly, expedient CCD countermeasures are often the most effective means of confusing an enemy. Along with the standard items and materials listed above, soldiers can use battlefield by-products, construction materials, and indigenous or locally procurable items to enhance unit CCD posture. For example, a simple building decoy can be constructed with two-by-fours and plywood. With the addition of a heat source, such as a small charcoal pit, the decoy becomes an apparently functional building. However, as with all CCD countermeasures, ensure that expedient treatments project the desired signatures to the enemy and do not actually increase the unit's vulnerability to detection. Expedient CCD countermeasures are also beneficial because the enemy has less time to study and become familiar with the selected countermeasures.

Chapter 2

Threat

The enemy employs a variety of sensors to detect and identify US soldiers, equipment, and supporting installations. These sensors may be visual, near infrared (NIR), IR, ultraviolet (UV), acoustic, or multispectral/hyperspectral. They may be employed by dismounted soldiers or ground-, air-, or space-mounted platforms. Such platforms are often capable of supporting multiple sensors. Friendly troops rarely know the specific sensor systems or combination of systems that an enemy employs. When possible, friendly troops should protect against all known threat surveillance systems.

DOCTRINE

2-1. Many threat forces were trained and equipped by the former Soviet Union. Its long-standing battlefield doctrine of *maskirovka* is a living legacy in many former Soviet-client states. Maskirovka incorporates all elements of CCD and tactical battlefield deception into a cohesive and effective philosophy. During the Gulf War, Iraq used maskirovka to effectively maintain its capability of surface-to-surface missiles (Scuds) in the face of persistent coalition-force attacks. Enemy forces that are trained in maskirovka possess a strong fundamental knowledge of CCD principles and techniques. Friendly forces must be very careful to conduct CCD operations so that a well-trained enemy will not easily recognize them.

2-2. Typical threat doctrine states that each battalion will continuously maintain two observation posts when in close contact with its enemy. An additional observation post is established when the battalion is in the defense or is preparing for an offense.

2-3. Patrolling is used extensively, but particularly during offensive operations. Patrols are used to detect the location of enemy indirect- and direct-fire weapons, gaps in formations, obstacles, and bypasses.

2-4. Enemy forces use raids to capture prisoners, documents, weapons, and equipment. A recon-in-force (usually by a reinforced company or battalion) is the most likely tactic when other methods of tactical recon have failed. A recon-in-force is often a deceptive tactic designed to simulate an offensive and cause friendly forces to reveal defensive positions.

ORGANIZATION

2-5. A typical enemy force conducts recon activities at all echelons. A troop recon is usually conducted by specially trained units. The following types of enemy units might

have specific intelligence-collection missions:

- **Troops.** An enemy uses ordinary combat troops to perform recon. One company per battalion trains to conduct recon operations behind enemy lines.
- **Motorized rifle and tank regiments.** Each regiment has a recon company and a chemical recon platoon.
- **Maneuver divisions.** Divisions have a recon battalion, an engineer recon platoon, a chemical recon platoon, and a target-acquisition battery.

DATA COLLECTION

2-6. An enemy collects information about United States (US) forces for two basic reasons—target acquisition and intelligence production. Enemy weapons systems often have sensors that locate and identify targets at long ranges in precise detail. Soldiers and units should take actions to hinder the enemy's target-acquisition process. These actions include all practical CCD operations expected to reduce the identification of soldiers, units, and facilities.

2-7. An enemy uses sensor systems to locate and identify large Army formations and headquarters (HQ) and to predict their future activities. Enemy detection of rear-area activities, such as logistics centers and communications nodes, may also reveal friendly intentions.

2-8. An enemy uses tactical recon to provide additional information on US forces' dispositions and the terrain in which they are going to operate. The enemy's tactical recon also attempts to identify targets for later attack by long-range artillery, rockets, aircraft, and ground forces.

SENSOR SYSTEMS

2-9. An enemy uses many different types of electronic surveillance equipment. Sensor systems are classified according to the part of the EM spectrum in which they operate. *Figure 2-1* shows the EM spectrum and some typical enemy sensors operating within specific regions of the spectrum. An enemy uses detection sensors that operate in the active or passive mode:

- **Active.** Active sensors emit energy that reflects from targets and is recaptured by the emitting or other nearby sensor, indicating the presence of a target. Examples of active sensors are searchlights and radar.
- **Passive.** Passive sensors do not emit energy; they collect energy, which may indicate the presence of a target. Examples of passive sensors are the human eye, night-vision devices (NVDs), IR imaging devices, acoustic sensors, and

photographic devices.

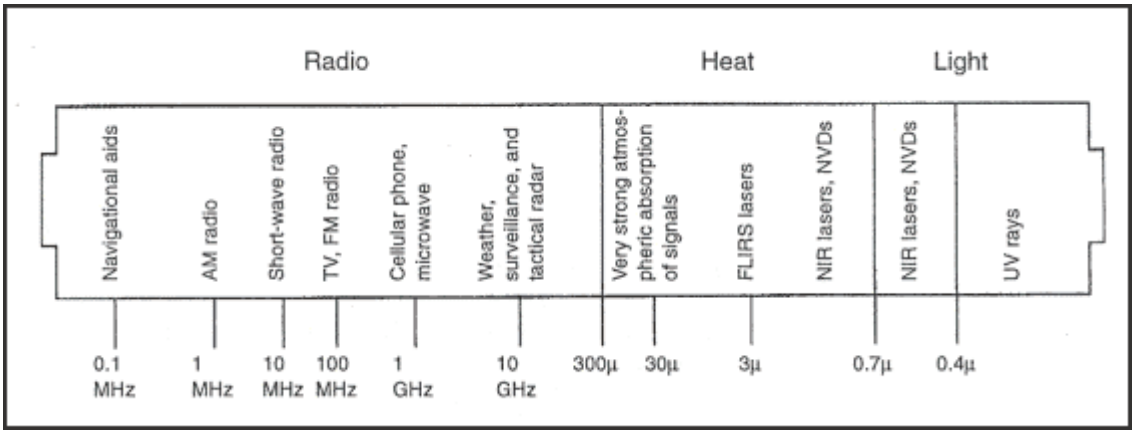

Figure 2-1. EM spectrum

VISUAL

2-10. Visual sensors work in the parts of the EM spectrum that are visible to the human eye. Enemy soldiers' eyes are the principle sensors on a battlefield. They may be aided by binoculars, telescopic sights, and image intensifiers. Civilian populations, enemy agents, recon teams, and patrols are visual-sensor systems from the enemy's intelligence viewpoint. Three types of enemy visual sensors are—

- **Image intensifiers.** Image intensifiers are passive night-observation devices. They amplify the low-level light that is present on even the darkest nights. These devices are used for surveillance and as weapon sights on small arms and vehicles. Airborne platforms are also capable of supporting image intensifiers.

- **Low-light television (LLTV).** LLTV combines image intensification with television technology, and it is usually mounted on airborne platforms.

- **Aerial recon, remote sensing, and imagery.** Aerial photography, satellite imagery, and video imagery allow image analysts to record and study visual information. These analysts then produce target nomination lists that are, in effect, priority lists of targets in a given target scene. Since analysts often have to make subjective determinations of the identity and/or importance of a given target, the ranking of targets provides the defender with an opportunity to use CCD to impact an enemy's target-prioritization process. Video systems allow transmission of visual images to the ground while the manned aircraft, satellite, or unmanned aerial vehicle (UAV) is still in flight.

NEAR INFRARED

2-11. NIR sensors operate at a wavelength immediately above the visible light wavelength of the EM spectrum (*Figure 2-1*). NIR energy reflects well from live vegetation but reflects better from dead vegetation and most man-made materials. NIR

sensors, such as sights and periscopes, allow the human eye to detect targets based on differences in their reflection of NIR energy. NIR sensors are partially blocked by fog, mist, and smoke operations, although not as completely as visual sensors. An enemy's combat vehicles use active NIR sensors that employ searchlights, scopes, and sights; but these sensors are rapidly being replaced with image intensifiers and thermal gun sights.

INFRARED

2-12. IR sensors detect the contrasts in heat energy that targets radiate on the battlefield and display the contrasts as different colors or shades. Because longer wavelength IR radiation is more susceptible to atmospheric absorption than NIR radiation, IR sensors are less affected by typical concentrations of fog or conventional smoke.

2-13. Differences in thermal mass and surface properties (reflectivity) of man-made and natural materials result in target-to-background contrasts. These contrast levels change dramatically over a daily cycle. For example, operating vehicles and generators, heated buildings and tents, and soldiers are usually hotter than their background. Also, equipment exposed to direct sunlight appears hotter than most natural backgrounds. At night, however, equipment might appear cooler than its background if it is treated with special emissivity coatings. In other words, military equipment, particularly metallic equipment, generally heats up and cools off more quickly than its background.

2-14. Sophisticated, passive IR sensors (such as the Forward-Looking Infrared System [FLIRS]) can be mounted on aircraft. FLIRS sensors provide aircrews and enemy ground forces with real-time IR imagery that is displayed on video monitors.

2-15. Recon aircraft often employ special IR films to record temperature differences. Due to film processing, however, these systems are subject to time delays in obtaining the data. Newer versions of this sensor produce non-film-based images.

ULTRAVIOLET

2-16. The UV area is the part of the EM spectrum immediately below visible light. UV sensors are more important in snow-covered areas, because snow reflects UV energy well and most white paints and man-made objects do not reflect UV energy very well. Photographic intelligence systems with simple UV filters highlight military targets as dark areas against snow-covered backgrounds. These backgrounds require specially designed camouflage that provides a high UV reflectance.

RADAR

2-17. Radar uses high-frequency radio waves to penetrate atmospheric impediments such as fog, mist, and smoke. Radar works by transmitting a very strong burst of radio waves and then receiving and processing the reflected waves. In general, metal objects reflect radar waves well, while radar waves are either weakly reflected by or pass through most other objects. The shape and size of a metal object determine the strength of the reflected signal. A large, metal object generally reflects more signal than a small object. Therefore, large, metal objects can be detected from greater distances. The method by which the received radio wave is processed determines the type of radar. Radar systems commonly

used against ground forces on the battlefield include—

- **Moving-target indicators (MTIs).** When an EM wave hits a moving target, the wave is reflected and changes frequency. The faster the target moves, the larger the changes in frequency. The simplest and most common battlefield radar detects this frequency change. Threat forces use MTIs for target acquisition. More sophisticated developmental radar systems, such as the Joint Surveillance Target Attack Radar System (JSTARS), use airborne surveillance platforms that downlink captured data to ground-station modules in near real time. Ground-based operators are then able to manipulate the data and gain heightened situational information, which is forwarded to command-and-control (C^2) nodes to enhance tactical decision-making.

- **Imaging radar.** An imaging radar's receiver and processor are so sensitive that an image of the detected target is displayed on a scope. Imaging radar, such as side-looking airborne radar (SLAR), is generally used on airborne or space-borne platforms. Imaging radar typically does not provide the same resolution as the FLIRS and is less likely to be used for terminal target acquisition.

- **Countermortar (CM) and counterbattery (CB) radar.** CM and CB radar usually transmit two beams of energy that sweep above the horizon. An artillery or mortar round or a rocket passing through the beams reflects two signals that are received and plotted to determine the origin of the round.

ACOUSTIC

2-18. The three predominant types of acoustical detection systems are—

- **Human ear.** Every soldier, whether engaged in normal operations or at a listening post, is an acoustic sensor. However, visual confirmation is usually preferred.

- **Flash-sound ranging.** Flash-sound ranging is used against artillery. Light travels faster than sound, so enemy sound-ranging teams can determine the distance to a gun tube by accurately measuring the time between seeing a muzzle flash and hearing the sound. If the sound is detected by two or more teams, analysts plot the ranges using automated data-processing computers. The target is located where the plots intersect.

- **Ground-based microphone array.** Ground-based microphone-array systems allow listeners to record acoustic signatures and accurately triangulate their positions.

RADIO

2-19. Threat forces make a great effort to search for, detect, and locate the sources of US radio communications. They use various direction-finding techniques to locate opposing emitters. Once an emitter is detected, an enemy can take a number of actions, ranging from simply intercepting the transmissions to jamming or targeting the emitter for destruction. (See FM 34-1 for more information on radio sensors.)