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Topographic Operations

Headquarters, Department of the Army

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# TOPOGRAPHIC OPERATIONS

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Preface

This field manual (FM) describes doctrine for topographic operations in support of the United States (US) Army's strategic, operational, and tactical missions.

The Army's strategic challenge is to prepare for the rise of a major military competitor who is both competent and capable. All topographic operations must rise to the challenges of providing topographic information to a battle commander so that the battle space can be visualized in time, space, and distance. This requires absolute fidelity and definition of the battle space for decision making and mission execution.

Appendix A contains an English-to-metric measurement conversion chart.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on Department of the Army (DA) Form 2028 directly to Commandant, US Army Engineer School (USAES), ATTN: ATSE-DOT-DD, Directorate of Training, 320 Engineer Loop, Suite 336, Fort Leonard Wood, Missouri 65473-8929.

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

Geospatial information and services (GI&S) incorporate the processes that collect, manage, extract, store, disseminate, and exploit geographic information and imagery. This process is an evolutionary change that reflects the expansion of previous topographic operations within the Army. The GI&S play a significant role in military operations. Geospatial information (GI) provides the foundation upon which all other battle-space information is referenced to form the common operating picture. The GI&S aid the commander in visualizing the battle space to plan and execute military operations effectively, to navigate, and to target the adversary accurately. The GI&S support plays an important role in the full range of military operations; commanders cannot afford to conduct military operations without up-to-date GI.

The GI&S within the future force structure combine the resources of national and commercial capabilities and host nations with the Army topographic-engineering community. This union allows the topographer to provide the battlefield commander a clear understanding of the current state (with relation to the enemy and the environment) and the ability to envision a desired end state (which represents mission accomplishment). The topographer molds the geographic information into map products, tactical decision aids (TDAs), user-defined topographic-analysis products or data sets, and precise geodetic-positioning products. These products can then be digitally transmitted or graphically plotted/printed to enhance battlefield visualization.

The engineer's GI&S technology is the cornerstone for information dominance that is critical for a smaller, agile, and more lethal army.
Chapter 1
The Army's Operational Concept for Battle Command

Historically, the Army has used the term command and control (C²) to describe the system that commanders used to plan, direct, coordinate, and control combat operations or other military activities. Because of confusion created by this terminology, the Army now emphasizes that command and control are two distinct, but interdependent, concepts rather than one. The commander and his staff, as a team, use command with control to accomplish the mission.

OVERVIEW

1-1. Battle command is the commander's portion of C². Battle command is the art of battle decision making, leading, and controlling operations. It includes—

• Controlling operations and motivating soldiers and their organizations into actions to accomplish missions.
• Visualizing the current and future states, then formulating a concept of the operation to progress from one phase to the other.
• Assigning missions.
• Prioritizing and allocating resources.
• Selecting the critical time and place to act.
• Knowing how and when to make adjustments during the fight.

1-2. Battle command requires the commander to have the mental agility, discipline, and experience necessary to make timely, relevant, and high-payoff decisions; to optimize the force's capabilities; and to control the tempo of mission execution.

ARMY XXI

1-3. Army XXI is the programmed force for the Army in the near-term development cycle. This cycle is undergoing upgrades to existing systems to take advantage of new technologies and opportunities immediately available for organizational improvement. United States Army Training and Doctrine Command (TRADOC) Pamphlet (Pam) 525-5 guides this development and addresses the familiar TRADOC requirements—doctrine, training, leader development, organization, materiel, and soldiers (DTLOMS).

1-4. Since the early 1990s, topographic-engineer units have been receiving more sophisticated equipment for performing GI&S for the Army. This
equipment has been an integral part of experimentation and evaluation to identify the specific functional and operational requirements for Army XXI.

**ARMY AFTER NEXT**

1-5. The Army After Next (AAN) is about ideas. The AAN project has become a laboratory—part technology oriented, part military-science oriented—in which the Army works with other government services and agencies, academic institutions, and civilian industry to build ideas about the future. The AAN differs from the efforts of other futures groups in that its participants take extra care to subject ideas to both the considered experience of military history and the analytical rigor of state-of-the-art gaming.

**BATTLEFIELD OPERATING SYSTEMS**

1-6. The tactical level of major war functions—the battlefield operating systems (BOSs)—are those occurring on the battlefield and performed by the force to execute operations (battles and engagements) successfully and to accomplish military objectives directed by the operational commander. The following are the BOSs and some examples of how they relate to topographic operations (refer to Appendix B for examples of standard and nonstandard topographic products as they apply to these systems):

- C^2 (battlefield visualization).
- Intelligence (mobility products and corridors and lines of communication [LOC]).
- Maneuver (bivouac sites, concealment, drop zones, and staging areas).
- Fire support (cover, concealment, mobility, and survey control points [SCPs]).
- Air defense (air avenues of approach, flight-line masking, and target acquisition).
- Mobility/survivability (M/S) (on- and off-road mobility predictions).
- Logistics (information on supply routes, railways, airfields, and storage facilities).

1-7. Topographic units provide support to all BOSs on the battlefield; however, the major emphasis for GI&S support is provided to the intelligence BOS for the intelligence preparation of the battlefield (IPB) and the M&S BOS for the engineer battlefield assessment (EBA).

1-8. The commander directs the intelligence effort by selecting and prioritizing intelligence requirements. These requirements support him in conducting and planning operations. The information he needs to visualize the outcome of current operations is called the commander's critical information requirements (CCIR), which includes information on both friendly and threat forces. The threat-information portion of the CCIR is the commander's priority intelligence requirements (PIR). The CCIR and PIR direct the operations of the topographic unit supporting the commander. In designating PIR, the commander establishes—

- What he wants.
- Why he wants it.
• When he wants it.
• How he wants it.

FUTURE OPERATIONAL CAPABILITIES

1-9. Future operational capabilities (FOC) are statements of operational capabilities required by the Army to develop war-fighting concepts (refer to the TRADOC Pam 525-series) approved by the TRADOC commander. The FOC address specific war-fighting capabilities, not functions or operations. Topographic operations in support of Force XXI and the AAN will be influenced by the integrated FOC, the branch-functional FOC, and the TRADOC-proponent FOC as described in TRADOC Pam 525-66. Refer to Appendix C for more FOC information.

MODELING AND SIMULATIONS/MISSION PLANNING AND REHEARSAL SYSTEMS

1-10. Technology provides the tools to allow a commander to visualize and assess the sequence of actions from the current state to the desired end state. There must be an integrated system to assist him in optimizing mission planning, to facilitate effective rehearsals, and to monitor understanding of his intent before and during mission execution. Training and combat systems must be similar and provide simulation-independent war-fighter descriptions of real-world processes, entities, environments, implementations, and relationships. Software must operate and support live-, virtual-, and constructive-simulation environments to approximate real combat. Technologies, including simulations and artificial intelligence, allow commanders to replicate the real world in an environment where risk is minimal.

1-11. Models and simulations, in conjunction with C² systems, are used for training and preparing for combat. Battlefield trends may be assessed rapidly and provide tools for exploring new courses of action (COAs) based on the current situation. A commander uses these tools by applying common sense and experience rather than accepting the computer solution as the best conclusion.

1-12. Military operations make use of modeling and simulation (M&S) applications for creating and analyzing operational plans and orders. Army C² systems using M&S applications will facilitate mission rehearsal. These applications must represent combat and the myriad of related support functions with sufficient resolution, fidelity, and detail to ensure high confidence in the results.

BATTLEFIELD VISUALIZATION

1-13. Battlefield visualization is the process whereby the commander develops a clear understanding of the current state with relation to the environment, envisions a desired end state that represents mission accomplishment, then subsequently visualizes the sequence of activity that moves his force from its current state to the end state.

1-14. Battlefield visualization is an essential leadership attribute of command and is critical for accomplishing missions. It is learned and attained through
training, practice, experience, wisdom, and available battle-command technologies. Other resources, both human and technological, serve only to assist a commander in formulating a vision and taking action to implement it. To be successful in battle, a commander must apply experience and intuition to sort through the myriad of information available on the battlefield.

1-15. Battlefield visualization requires the use of operational tools that are derived from science and technology. However, technology alone cannot provide a commander with full battlefield visualization. Technology must be used together with a commander’s judgment, wisdom, experience, and intuitive sense to enhance battlefield visualization.

1-16. Battlefield visualization is the heart of battle command. A commander must be able to clearly articulate his battlefield vision to his subordinates in his intent statement. This ensures the optimum development of his concept of operations (see Figure 1-1).

1-17. Battlefield visualization is essential to establishing the battlefield framework as described in FM 71-100. The commander must first gain an understanding of the battlefield. This includes the state of his unit, the state of the enemy, and the impact of terrain and weather. He must then visualize the desired end state and envision a sequence of actions (an intellectual war game) that will cause his forces to arrive at the desired end state.
TERRAIN VISUALIZATION

1-18. Terrain visualization is the process through which a commander sees the terrain and understands its impact on the operation in which he is involved. This includes the impact on both friendly and enemy elements. It is the identification and understanding of terrain aspects that can be exploited by the friendly commander to gain advantage over the enemy as well as those most likely to be used by the enemy. It is the subjective evaluation of the terrain's physical attributes as well as the physical capabilities of vehicles, equipment, and personnel that must cross over and occupy the terrain. Terrain visualization is closer to military art than to military science.

1-19. Terrain visualization is a basic and fundamental leadership skill. A battle commander must understand how terrain influences every aspect of military operations. Commanders require a detailed awareness of the entire situation, including the environment, enemy, and friendly situations.

1-20. Terrain visualization is far from a new requirement. However, in the era of force projection, every means available must be used to provide battle commanders with this fundamental knowledge of terrain while planning for operations. Information technology and force digitization provide a means to that end. Terrain visualization is a component of battlefield visualization. It portrays and allows a detailed understanding of the background upon which enemy and friendly forces and actions are displayed. Topography provides the picture whereby the user can visualize the terrain. Terrain visualization includes the subordinate elements of data collection, database development, analysis, display, distribution, and database management. These elements include both new and changed tasks due to the new way of looking at the battlefield based on digital data. The elements are designed to provide the necessary visualization for the commander and to control and manage a central terrain database. The process of terrain visualization depends highly on joint and combined digital terrain processing means and the uninterrupted electronic transfer of large amounts of information.

1-21. A commander requires the ability to see the battlefield on which his units and the enemy will deploy, maneuver, and fight. The resolution of information demanded increases as the echelon of command decreases. Lower echelons may require slope, elevation, trafficability, vegetation, or natural- and man-made-feature information layers in much more detail. Commanders have traditionally visualized the battlefield's four dimensions (width, depth, height, and time) using traditional two-dimensional paper maps. The current and emerging terrain-visualization tools will enhance the commander's view of the battle space by providing oblique, perspective, and other views in four dimensions.

1-22. Terrain visualization includes both natural and man-made features and the impact of terrain on vehicle speed, maintenance, river-crossing operations, cross-country trafficability, and maneuverability. Terrain-visualization products assist the commander during all phases of the operation. Digitized terrain provides a common terrain background for all users and applications. Additionally, terrain visualization allows interactive planning and mission rehearsal. Terrain-visualization technology must reflect real-time updates as the features change due to the effects of combat and nature.
1-23. Terrain visualization is a significant part of the military decision-making process. In this process, a commander uses the topographic-analysis element within his echelon to collect, analyze, evaluate, and interpret military geographic information on the terrain's natural and man-made features in combination with other factors to provide predictive information and advice about the terrain's effect on military operations. Simply stated, the commander requires topographic analyses to increase his knowledge of the battlefield.

ARMY OPERATIONS

1-24. Operations are designed and conducted to accomplish assigned missions. Army forces conduct operations to compel, deter, reassure, and support. All operations are composed of four basic categories—offense, defense, stability, and support—around which commanders design their operations to achieve victory. The categories of operations apply to both violent and nonviolent environments. The strength in recognizing and employing categories is that they allow a commander operational flexibility in accomplishing a broad range of missions. In training, planning, and executing, this comprehensive view toward operations enables forces to change their focus based on the changing context within which operations are conducted.

OFFENSE

1-25. Offensive operations carry the fight to the enemy. They are decisive operations—the commander's ultimate means of imposing his will on the enemy. Offensive operations combine both force and terrain objectives. There are four general types of offensive operations—

- Movement to contact (MTC).
- Attack.
- Exploitation.
- Pursuit.

DEFENSE

1-26. Defensive operations are those undertaken to cause an enemy's attack to fail. Although they are a stronger category, they cannot achieve a decision alone. Defensive operations must ultimately be combined with or followed by an offensive action. Defensive operations orient on force and terrain. In planning these operations, commanders ordinarily combine three basic types of defensive operations—

- Mobile defense.
- Area defense.
- Retrograde.

STABILITY

1-27. Stability operations apply military power to influence the political environment, facilitate diplomacy, and disrupt specified illegal activities. They include both developmental and coercive actions. Because of their
nature, stability operations complement and are complemented by offensive, defensive, and support operations.

**SUPPORT**

1-28. Support operations provide essential supplies and services to assist designated groups. They are conducted mainly to relieve suffering and to assist civil authorities in responding to crises. Support operations may be independent actions or they may complement offensive, defensive, and stability operations. The vast majority of offensive, defensive, and stability operations will likely require complementary support operations before, during, and after execution.

1-29. The categories of operations apply to the full range of missions, including large-scale operations against sophisticated mechanized forces; operations to counter insurgencies and terrorism; operations to deter aggression against friendly governments; peace operations; and actions that provide support and assistance. When assigned a mission, a commander analyzes the factors of mission, enemy, terrain, troops, time available, and civilian considerations (METT-TC) to determine how and to what degree he will incorporate the categories into the overall concept of the operation. Commanders use the planning process to determine how best to orchestrate the four operational categories to achieve a desired end state.
Chapter 2
Organizations and Force Structure

The GI&S assets are task-organized (based on METT-TC) to support Army, joint, and combined operations at all levels and throughout the spectrum of conflict. These assets remain flexible to meet mission requirements. Units may deploy in full to support the operation or they may employ split-based operations. The GI&S support for split-based operations requires a robust communications system for transmitting data and products between the deployed element and the split-based element. Split-based logistics include everything from one squad to a company minus the support platoon. In most situations, a squad of terrain analysts and surveyors will deploy into a theater of operations (TO) with the initial-entry force. Additional topographic elements will follow based on the size of force buildup. The entry force will provide rapid-response mapping and TDA support for the task force (TF), while GI&S support will continue from the split-based element using national and commercial sources not readily available to the forward-presence element.

UNIFIED COMMANDS

2-1. Unified and component commanders define military task requirements to support contingency plans (CONPLANs), operation plans (OPLANs), and operations orders (OPORDs) based on the commander's concept of the operation. The corresponding echelon for topographic support and the theater GI&S officer advise the Intelligence Directorate (J 2) and other staff officers in preparing the global geospatial information and services (GGI&S) annex for each CONPLAN, OPLAN, or OPORD. The commander outlines the specific support requirements needed for the command.

JOINT TASK FORCE

2-2. Joint task force (JTF) topographic support assets identify GI&S requirements to support OPORDs and coordinate support within their TF. They also collect, review, and validate topographic requirements from component commands. These topographic assets can come from a division, corps, or theater unit, depending on the JTF’s task organization.

ARMY FORCES

2-3. Topographic units are task-organized to provide GI&S support for Army forces (ARFOR) in the JTF. This support includes directing, supervising, and coordinating all topographic issues having an impact on the command.
NATIONAL IMAGERY AND MAPPING AGENCY

2-4. The National Imagery and Mapping Agency's (NIMA's) role is to support the war fighter through priorities established by the commanders in chief (CINCs). This support comes in the form of imagery, imagery intelligence, and GI (including standard maps and data sets) in support of national security objectives. The agency's vision is to guarantee ready access to the world's imagery, imagery intelligence, and GI.

2-5. NIMA has technical and liaison representatives at the CINC level who work with the staff and the GI&S officer to establish requirements and priorities and to identify the best products and services that NIMA can provide. These representatives prioritize, validate, and consolidate requirements identified by major subordinate commands (MSCs).

2-6. NIMA has a global mission, as established by the NIMA Act of 1996. It has the unique responsibilities of managing and providing imagery and GI to national policy makers and military forces. NIMA is also an established part of the US intelligence community in recognition of its unique responsibilities and global mission. The agency incorporates the now disestablished Defense Mapping Agency (DMA), the Central Imagery Office, and the Defense Dissemination Program Office in their entirety. It also incorporates the mission and functions of the Central Intelligence Agency's (CIA's) National Photographic Interpretation Center. Also included in NIMA are the imagery exploitation, dissemination, and processing elements of the Defense Intelligence Agency, the National Reconnaissance Office, and the Defense Airborne Reconnaissance Office.

2-7. NIMA brings together in a single organization the imagery tasking, production, exploitation, and dissemination (TPED) responsibilities and the mapping, charting, and geodetic functions of eight separate organizations of the defense and intelligence communities. NIMA continues to improve support to national and military customers through comprehensive management of US imaging and geospatial capabilities.

DEFENSE LOGISTICS AGENCY

2-8. The Defense Logistics Agency (DLA) is a logistics combat-support agency whose primary role is to provide supplies and services to US military forces worldwide. The DLA's mission includes managing over four million consumable items and processing over 30 million annual distribution actions. The DLA manages the inventory of NIMA's hard-copy media (including paper maps, charts, compact disks—read-only memory [CD-ROMs], laser disks, publications, and pamphlets). The DLA processes customer requisitions and inquiries. It is responsible for receipt processing, storing, issuing, packing, shipping, filling subscriptions, and processing customer-unique requirements.

CORPS OF ENGINEERS

2-9. The Engineer Research and Development Center (ERDC) is the US Army Corps of Engineers' (USACE's) distributed research and development command. It consists of eight unique laboratories—five in Vicksburg, Mississippi, and one each in Hanover, New Hampshire; Champaign, Illinois;
and Alexandria, Virginia. The ERDC's headquarters is located in Vicksburg, Mississippi.

2-10. The ERDC provides world-renowned scientists and engineers using the latest in specialized equipment to address problems facing the military and the nation. Research support includes—

- Mapping and topographic analysis.
- Infrastructure design, construction, operations, and maintenance.
- Structural engineering.
- Cold regions and ice engineering.
- Coastal and hydraulic engineering.
- Environmental quality.
- Geotechnical engineering.
- High-performance computing and information technology.

The following are laboratories within the ERDC:

- The Coastal and Hydraulics Laboratory in Vicksburg, Mississippi.
- The Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire.
- The Construction Engineering Research Laboratory in Champaign, Illinois.
- The Environmental Laboratory in Vicksburg, Mississippi.
- The Geotechnical Laboratory in Vicksburg, Mississippi.
- The Information Technology Laboratory in Vicksburg, Mississippi.
- The Structures Laboratory in Vicksburg, Mississippi.
- The Topographic-Engineering Center in Alexandria, Virginia.

**TOPOGRAPHIC-ENGINEERING CENTER**

2-11. The Topographic-Engineering Center (TEC) in Alexandria, Virginia, provides technical expertise and analytical products that support topographic engineering. The TEC is under the command of the ERDC's commander, who is subordinate to the Commanding General, USACE. The TEC serves as the Army's center of technical expertise on all digital topographic matters. Its mission is to provide the war fighter with a superior knowledge of the battle space and to support the nation's civil and environmental initiatives through research, development, and expertise in the topographic and related sciences. The TEC has 5 major divisions with 16 branches of support.

2-12. The TEC provides a variety of topographic services to the Army along with topographic research, development, testing, evaluation, M&S, and acquisition. The TEC supplies software to support GI&S. It also provides technical support for TEC-developed software, commercial-off-the-shelf (COTS)/nondevelopmental-item hardware, TDA software, survey and positioning systems, digital databases, and digital imagery.

**TEC'S COMMERCIAL IMAGERY LIBRARY**

2-13. The TEC's Geospatial Information Division (GID) was designated by the Office of the Assistant Chief of Engineers in 1990 to monitor the Army's
commercial/civil imagery (C2I) acquisition. This action was designed to prevent Army agencies or organizations from duplicating C2I data purchases.

KEY CAPABILITIES

2-14. Efficient management of the research, acquisition, and distribution of imagery and products is increasingly important as Army units expand their use of this technology, especially with the fielding of the Digital Topographic Support System (DTSS). The GID serves several functions in its role as monitor (as defined in a memorandum of understanding [MOU] between the Army and the US Geological Survey [USGS], dated November 26, 1990). These functions include—

• Acting as the Army's primary point of contact (POC) for C2I sources to support engineer- and terrain-analysis operations and applications.
• Acting as the monitor for all Army purchases of C2I.
• Serving as a repository of purchases and scenes available to the Department of Defense (DOD) that are crucial to Army missions.

US ARMY SPACE AND MISSILE COMMAND

2-15. The US Army Space and Missile Defense Command (SMDC) optimizes access to space-based information sources and communication means in support of Army operations. The SMDC uses commercial, foreign, and DOD satellite assets to augment standard topographic data sources and data distribution. Such satellite assets generate responsive data input to the Geographic Information Systems (GISs) operated by Army topographic units. The SMDC serves as the Army's leader for direct downlinking of topographic imagery data as well as the development of tactics, techniques, and procedures (TTPs) on the preprocessing and transfer of remote-sensing data. At the tasking of the DA Deputy Chief of Staff for Operations and Plans (DCSOPS), the Army Space Command (ARSPACE) (located within the SMDC) provides rapid-response imagery. ARSPACE maintains the capability to deploy rapidly with emerging space-based spectral-imagery technology in support of topographic task organizations.

ARMY SERVICE LEVEL

2-16. The Deputy Chief of Staff for Intelligence (DCSINT) at Headquarters, DA (HQDA) is responsible for developing (in coordination with the DCSOPS) topographic plans and programs, identifying and validating Army mapping requirements, and coordinating mapping issues with the Office of the Joint Chiefs of Staff, NIMA, and other DOD organizations. The chief of engineers is responsible for executing the Army's topographic program and providing GI&S advice and technical support to the DA staff (refer to Army Regulation [AR] 115-11 for more information).

TRADOC PROGRAM INTEGRATION OFFICE—TERRAIN DATA

2-17. The TRADOC Program Integration Office (TPIO) acts as the Army's centralized manager for coordinating and synchronizing all Army digital terrain data requirements for digital force development and training,
experimentation, combat developments, and M&S. This mission incorporates the integration, interoperability, and commonality aspects of terrain data and products for the necessary development, testing, production, and fielding of Army systems requiring digital terrain data. The TPIO reports to the Commander, TRADOC through the Commander, US Army Maneuver Support Center (MANSCEN) and the Deputy Commanding General, Combined Arms Center.

2-18. The TPIO will integrate terrain data requirements for live, virtual, and constructive M&S for the training, exercises, and military operations (TEMO); advanced concepts and requirements (ACR); and research, development, and acquisition (RDA) domains.

MANEUVER-SUPPORT BATTLE LABORATORY

2-19. The Maneuver-Support Battle Laboratory's (MSBL's) mission is to be the Army's primary maneuver-support war-fighting experimentation resource. The MSBL integrates experimentation actions across the DTLOMS spectrum and provides enhanced capabilities to soldiers through analyses, insights, and recommendations to the architects of the future army. The MSBL ensures that topography (as a part of maneuver support) is included in all future war-fighting concepts. The lab conducts analyses of experiments to provide input across the DTLOMS spectrum. The MSBL's enduring battlefield function is performing operations to protect the force from the effects of enemy action and providing the force with the freedom of movement during military operations. The enduring battlefield functions of maneuver, fires, battle command, and sustainment all require continuous support from maneuver-support forces that are composed primarily of military police (MP), chemical, and engineer soldiers.

PROGRAM EXECUTIVE OFFICE—COMMAND, CONTROL AND COMMUNICATIONS SYSTEMS

2-20. The Program Executive Office for Command, Control, and Communications Systems (PEOC3S) is the material-developer manager for Army Battlefield Command Systems (ABCSs). This office provides overall architecture-based engineering and integration management and oversight for developing command, control, and communications (C3) systems throughout each ABCS's life cycle. The DTSS is included within the ABCS to provide geographic information and support services.

PROJECT DIRECTOR, COMBAT TERRAIN INFORMATION SYSTEM

2-21. The Combat Terrain Information System (CTIS) is an Army program managed by the PEOC3S and colocated at the TEC. The CTIS project director is responsible for project management and the material development and acquisition program for a CTIS. He develops and acquires assigned tactical topographic-support systems that include the following:

- The DTSS-Heavy (DTSS-H).
- The DTSS-Light (DTSS-L).
- The DTSS-Deployable (DTSS-D).
- The DTSS-Base (DTSS-B).
2-22. These systems will enable topographic units to analyze and develop reports and to manage the geographic information database to provide terrain visualization to commanders. The DTSS will also facilitate dissemination of digital and hard-copy topographic products to all battlefield functional areas.

US ARMY ENGINEER SCHOOL

2-23. The USAES located under the MANSCEN is the Army's school for all engineers and is the TRADOC proponent for topography. The engineer component of the MANSCEN is responsible for developing topographic concepts, materiel requirements, combat developments, training requirements, and doctrine for the design of the topographic force structure and all matters related to Army topographers and topographic units.

DEFENSE MAPPING SCHOOL

2-24. The Defense Mapping School (DMS) conducts Army topographic institutional training at all levels with direction from the USAES. Entry-level training is focused on developing basic cartographic and terrain-analysis skills. Midlevel training is focused on managing GI&S data, developing advanced topographic-analysis skills, and generating products. The leadership training is focused on integrating GI&S throughout the military planning and decision-making process. The DMS also provides mobile training teams for sustainment training to the units. It is one of four schools in NIMA's training arm; it falls under the National Imagery and Mapping College (NIMC) located at Fort Belvoir, Virginia.

QUARTERMASTER

2-25. Quartermaster Corps proponent units have the responsibility at all levels for distributing (storage, requisition, processing, and issuance) unclassified standard geospatial products to units that maintain a standard DOD activity address code (DODAAC). Classified products are distributed through logistics units; however, units must have a DODAAC capable of receiving classified documents.

COMMUNICATIONS SYSTEMS

2-26. The signal community is responsible for providing state-of-the-art communication systems for rapidly moving data and products to the maneuver commander. These systems will ensure that the common topographic operating environment (CTOE) is available for every ABCS platform down to the lowest level. The C² systems relying on digital geospatial data must receive that data according to procedures established by signal elements.

INTELLIGENCE UNITS

2-27. Intelligence units at all levels are responsible for integrating topographic information into the IPB process and for assisting commanders in the decision-making process. The Assistant Chief of Staff, G2 (Intelligence) (G2) and Intelligence Officer (US Army) (S2) provide a conduit for topographic requirements and priorities for their commanders. The division and corps G2s