Terrain Analysis As a Combat Multiplier Just Got Better

By Major Joseph J. Piek and Captain Dirk E. Plante

"The field is looking to you with great expectations," said MG Robert Flowers, Commanding General of the U.S. Army Engineer Center, at the Defense Mapping School (DMS) at Fort Belvoir, Virginia, on 21 November 1997. The occasion was the graduation of the Army's first Advanced Individual Training class of military occupational specialty (MOS) 81T Topographic Analysts.

The newest MOS in the Corps of Engineers, 81T is a consolidation of two previous MOSs: 81C Cartographer and 81Q Terrain Analyst. The new 81T Basic Topographic Analyst Course (BTAC) couples the most critical elements of cartography and terrain analysis with robust imagery and computer capabilities to bridge the gap from the *manual* topographic methods of the past to the *digital* terrain visualization and information management capabilities of today's Army. The responsibility to produce highly trained, fully qualified 81T soldiers rests with the Defense Mapping School.

Defense Mapping School

Established in 1972, DMS is the Department of Defense joint service school that was for many years a training arm of the Defense Mapping Agency. On 1 October 1996, the National Imagery and Mapping Agency (NIMA) was formed, combining the nation's mapping and imagery agencies under one Combat Support Agency. Today, DMS is the largest of four schools in NIMA's National Imagery and Mapping College. It trains members of the Army, Navy, Air Force, and Marine Corps—as well as Department of Defense civilians and international students—in mapping, charting, geodesy; printing technology; and geophysical surveying. Instructors assigned to DMS come from throughout the Department of Defense, including Army and Marine topographic units; Army, Navy, Air Force, and Marine Corps intelligence units; and NIMA cartographic production divisions.

What Is an 81T?

The Topographic Analyst MOS was first proposed in the early 1990s. SGM Ted Poulson, the DMS Sergeant Major, recalls, "The 81C soldier was no longer responsible for making maps, only map revisions, while the 81Q soldier saw an ever-

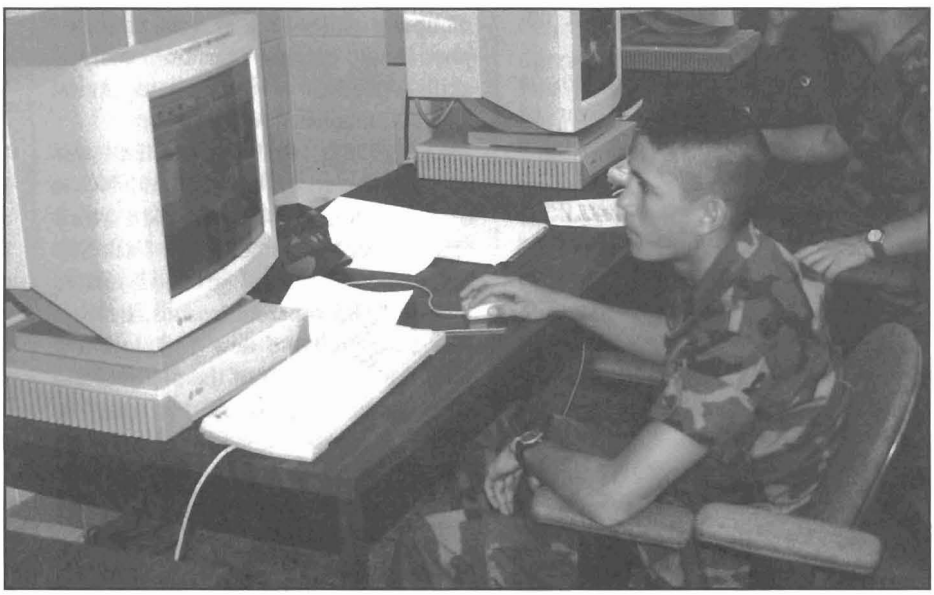


Photo by Andre Piller (NIMA)

A student prepares a digital product on the Sun SPARC 20 workstation.

accelerating mission for creating terrain analysis products that came about with advances in technology." In reality, Army topographic units already had 81C and 81Q soldiers perform closely related tasks. Evolution in the missions of the two MOSs offered an opportunity for change: to produce soldiers who could provide critical products derived from imagery and other intelligence during the mission analysis process, yet retain the skills to create a map from scratch if required. Consolidation of the two MOSs was approved by the U.S. Army Engineer School in 1995.

The consolidation effort began in April 1997, as 81C and 81Q soldiers Armywide converted to MOS 81T. Soldiers and noncommissioned officers (NCOs) successfully trained by DMS using the new 81T curriculum are immediately awarded the MOS. Additionally, 81C and 81Q sergeants first class and above were automatically awarded the MOS. However, former 81C and 81Q staff sergeants and below who are already in the field and will not have the opportunity to receive formal training at DMS are required to be certified by the first lieutenant colonel in their chain of command before being awarded MOS 81T. Until soldiers are certified, they will carry the Y2 identifier, signifying transition to a new MOS which requires supervised on-the-job training.

The DMS Topography Division began instructing the 81T Advanced Topographic Analyst Course (ATAC) in August 1997 and graduated its first class of 10 students on 18 December 1997. The ATAC is the technical track of the Engineer School's Basic NCO Course (BNCOC). NCOs attend ATAC after completing the core track of BNCOC at Fort Leonard Wood. The 18-week ATAC is unique in that it trains Army, Marine, and international students side-by-side in the same classroom, offering joint training experience for junior NCOs. ATAC students train for 14 of their 18 weeks on the Digital Topographic Support System Multispectral Image Processor. Beyond learning how to master the capabilities of the Army's premier terrain analysis computer system, ATAC students also learn to manage the improved capabilities of the new 81T Topographic Analyst.

81T Course Development

The DMS Topography Division includes Army, Marine, Air Force, and civilian instructors. They had the not-so-simple mission to combine 13 weeks of training for MOS 81C with 16 weeks of training for MOS 81Q and create a course to train the new MOS 81T in just 18 weeks.

Late in 1996, instructors from DMS met with members of the Engineer School's Directorate of Training to determine what tasks 81T soldiers needed to be trained at all skill levels. This Task Site Selection Board selected the essential skills 81T soldiers would need to be successful in topographic analysis detachments at the division level and topographic companies and battalions that support the corps and echelons above corps commanders. The end result was an approved 81T task list—the central element in the entire curriculum-development process. With the push toward digitization of the battlespace under the Force XXI, Army 2010, and Army After Next initiatives, the focus of the new course is on computer skills—rather than cartography and manual terrain analysis skills—needed to manipulate digital data and imagery.

After the 81T task list was approved, warrant officers and NCOs of the topography division took requirements outlined by the Task Site Selection Board and grouped related tasks into 85 separate lessons. Instructors compared the new 81T task list with the curriculum of the old 81C and 81Q courses and found that many of the old lessons remained applicable for manual portions of the new course. However, the lessons needed to be refined, drastically shortened, or updated.

Since the trainers were treading on relatively new ground regarding the computer training portion of the 81T course, many of these lessons needed to be developed. Several computer-training lesson plans were available but had to be revised and lengthened to meet task list requirements. Instructors also built many practical exercises for each computer application so 81T students can strengthen skills in each software application.

More than 3,000 instructor hours were needed to modify existing computer-based instruction and develop new lesson materials. Lesson plans ranging from one hour to several days were created using Microsoft Office software. This software allows instructors to present lessons as PowerPoint slide shows using an LCD projector and instantly change or update course materials.

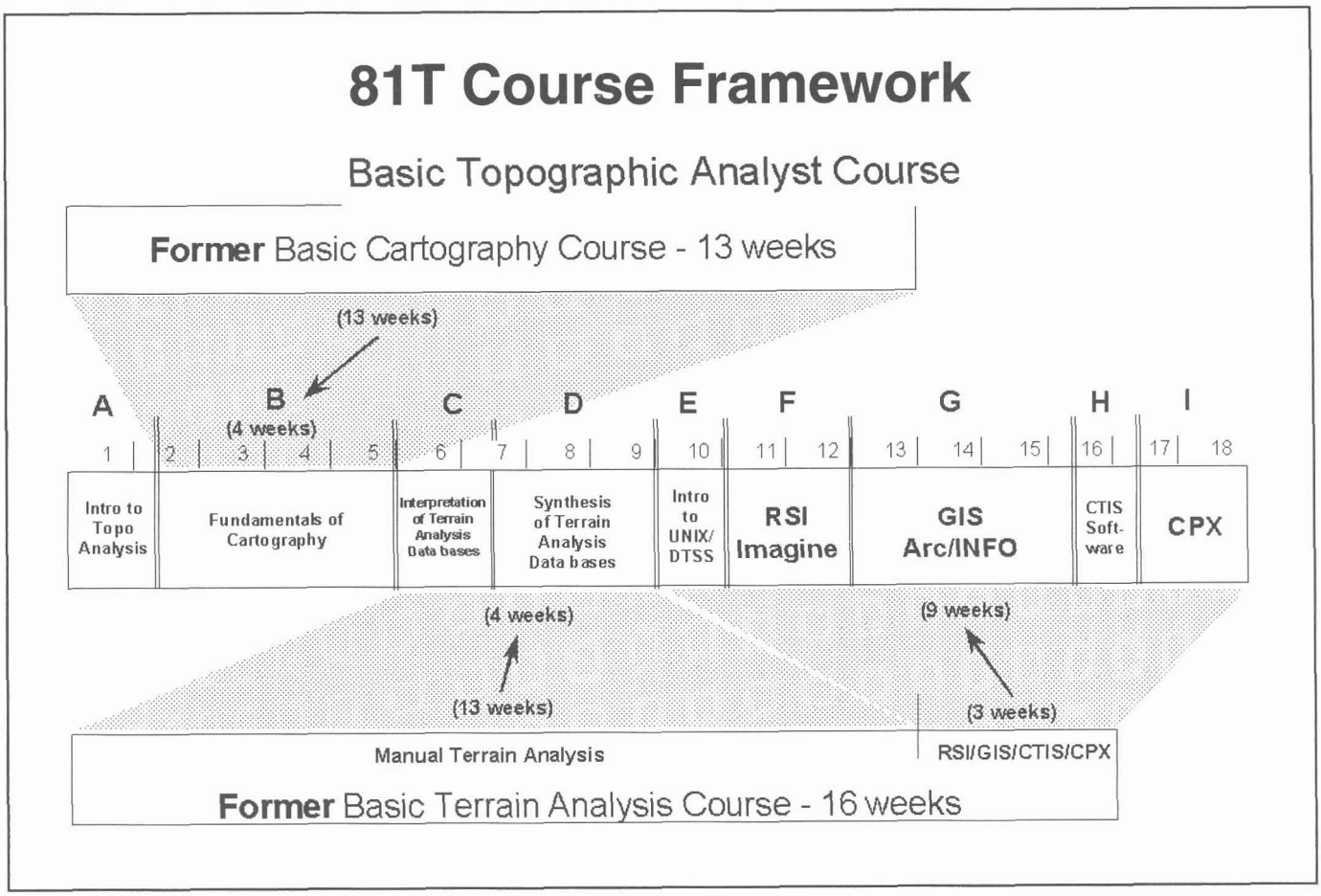
The new 81T course includes more than eight weeks of manual cartography and terrain analysis and more than nine weeks of instruction on computers and software used by 81T students. The time devoted to computer training tripled from that previously provided to 81Q students.

The Marine basic terrain analysis curriculum is called the Basic Topography (BTOPO) Course. Even though the Army BTAC and Marine BTOPO curricula are similar, the Army and Marine Corps basic students are not trained side-by-side because of several differences in the required training for each service. The Marine course is 20 academic weeks, while the Army course is 18 weeks.

Implementation

The 14 soldiers in the first 81T10 course began training in July 1997. The figure on page 33 illustrates how the 18 academic weeks are broken into nine blocks of training. Blocks A through D are the manual portion of BTAC, and E through I are the computer blocks of training.

For the manual portion of the course, soldiers work on light tables with classic cartographer and terrain analyst tools, such as invar bar scales, compasses, pocket stereoscopes,



straightedges, and scribers. They construct map grids, scribe map features, create factor overlays, and determine intervisibility.

In the automated or computer portion of the course, soldiers train on state-of-the-art UNIX-based Sun Microsystems workstations, including the SPARC 20 and ULTRA 1 computers. They work at individual workstations, whereas during previous 81Q computer training lessons, two or three soldiers trained together on each computer system. The topography division has adopted a one-student-per-workstation policy to maximize hands-on time. This approach results in each soldier receiving more than 300 hours of individual computer instruction during the 81T class—a 600 percent increase over the previous 81Q course. Soldiers receive training in Remotely Sensed Imagery, Geographic Information Systems, and Combat Terrain Information Systems software. They learn to produce critical products used during the mission analysis process, specifically during the intelligence preparation of the battlefield (IPB). Block I, the Command Post Exercise, is a 10-day final exam requiring that soldiers produce nine IPB products, including a combined obstacles overlay, cover and concealment overlay, elevation layer tint, line-of-sight overlay, and minefield overprint.

To ensure that soldiers received the training specified and enough time was allotted for individual lessons, the topography division staff evaluated the lesson plans for content and length after each block of instruction during the first 8IT class. These evaluations served as an internal after-action review. They were combined with comments from soldiers in the class to improve the course content for BTAC students in 1998. The topography division is working with several field units to provide copies of the BTAC lessons for their 81T supervised on-the-job training, as well as other unit training.

Topographic Analyst Graduation

The 14 graduates of BTAC Class 1-97 were inspired by General Flowers' stories of the key roles their forerunners played in successful operations from World War II through Desert Shield and Desert Storm. He reminded the new graduates, "The first soldiers stood up for deployment (for these operations) were topographic soldiers flown to Bahrain to begin the intelligence preparation necessary for operations in the Persian Gulf area." Colonel Robert Kirby, Commander and Deputy Director of the U.S. Army Topographic Engineering Center in Alexandria, Virginia, described how the mapping community has evolved—since he was a student studying celestial navigation to today where "We live in a world of Global Positioning Systems, multispectral analysis, and new technology that helps us do our job better." He

concluded by saying, "The tools of our trade may change, but our fundamentals and purpose have not."

Strength Through Knowledge

Topographic analyst support to the combined-arms team is critical. Alongside the combat, general, and construction engineer MOSs, the timely and accurate terrain information provided by 81T soldiers is a combat multiplier that gives the commander a decisive edge over the enemy. When the commander can visualize the terrain and understand its impact on both friendly and enemy operations, the topographic analyst has done his job.

In 1998, the Defense Mapping School Topography Division will conduct five BTAC and two ATAC classes and train nearly 100 of the Army's newest soldiers, the 81T Topographic Analysts. MG Flowers said it best at the first 81T graduation, "Our Army must be able to dominate terrain to be successful, and you're the ones who will make that happen."

Major Piek is the Chief, Topography Division, Defense Mapping School, Fort Belvoir, Virginia. Previous assignments include the Office of the Chief of Public Affairs at the Pentagon; Commander, 70th Engineer Company, 29th Engineer Battalion, Fort Shafter, Hawaii; and Survey Company Executive Officer, Battalion S4, and Platoon Leader, 30th Engineer Battalion. MAJ Piek holds a master's degree in journalism from Marshall University, Huntington, West Virginia.

Captain Plante is the Deputy Chief, Topography Division, Defense Mapping School. Previous assignments include Commander, Company B, 37th Engineer Battalion, Fort Bragg, North Carolina; and Executive Officer, Company D, and Platoon Leader, Company A, 237th Engineer Battalion, Heilbronn, Germany. CPT Plante holds a bachelor's degree in physics from Texas Christian University, Fort Worth, Texas.

Letter To The Editor

An article in the November 1997 issue of Engineer by Lieutenant Corr (Engineer Qualification Tables: A New Training Methodology) caught my attention. While the author correctly credited the Engineer Brigade with development of the EQT, the grayed side bar on page 30 and the endnote on page 31 attributed development to the 10th Engineer Battalion. Here are the facts:

Colonel Carl Strock (now BG Strock), Captain Matt O Brian and Sergeant First Class Mike Bergeron developed those tables while in the Engineer Brigade for the 3rd Infantry Division (formerly the 24th ID) at Fort Stewart. We began work in August 1995 and tested the tables on two battalions, the 11th Engineer Battalion in July 1996 and the 317th Engineer Battalion in October 1996.

The key to success was designing them to match existing tables that infantry and armor units already used and understood. The EQT had an immediate impact at Fort Stewart and Fort Benning (home of the 317th Engineer Battalion and the 3rd Brigade) by getting us range and ammunition resources previously denied to us. We intentionally designed the tables to match the resource limitations in DA PAM 350-38. As for comments by active duty engineers that the tables are redundant, that was the whole point. The tables are grouped (like the maneuver tables) into individual/leader skills, section/squad skills, and platoon training. Within those groups are tables that allow the leader of that unit to first train (practice) on his own, then be certified as ready by his next higher headquarters, and finally qualify to standards using evaluators from the headquarters two levels up.

The hardest part of our year-long development and testing process was getting agreement on what skills we should include to make engineer squads/platoons qualified. It came down to those tasks that COL Strock decided (as the commander) should be included. We sent the whole package to the Engineer School back in June 1996 (POC Mr. Rayburn Toy).

Major Bob McCarty
Operations Group Bravo
Battle Command Training Program
Fort Leavenworth

Engineer School s reply:

You are right on target. The EQTs were developed by you and staff in the Engineer Brigade, 3rd ID, at Fort Stewart. We are thankful for your concerted effort. Your tables stand as the basis for the final product we will distribute during the third quarter of FY98 in a new publication TC 5-150, Engineer Qualification Tables. The staffing actions of your tables and the many variations we received from units throughout the force enabled the Engineer School to publish a common standard for combat engineers.

The measurement of relevant training, as applied to the tables, instills many training captains to unintentionally apply words of ownership or authorship to successful events. Again, thank you for your effort and continued support.

Rayburn Toy
Training Specialist
Collective Analysis Branch
Department of Training and Doctrine Development