Future Command and Control Systems

IVIS and B^2C^2 Only Scratch the Surface

by Major Timothy D. Cherry

Photo by Greg Stewart

Last April, we witnessed in NTC Rotation 94-07 the most significant experiment the Army has conducted since the Louisiana Maneuvers in 1940. Most first-hand observers will agree that the experiment was a success and digitization is here to stay. The need for visual, real-time information-sharing on the battlefield is critical to successful mission accomplishment at minimum cost to soldiers and equipment.

One of the NTC's charters during this experiment was to identify what the future digital "end-product" should look like and be capable of. To accomplish that and help facilitate the experiment, many of us received hands-on training at Fort Knox on both the Intervehicular Information System (IVIS) and Brigade and Below Command and Control (B^2C^2) computer systems to better understand their capabilities and limitations. Throughout this training and experiment, I analyzed these systems and developed a list of capabilities that must be incorporated in future digital C^2 systems. I based my observations on my experience with the Army's premier "digital" system — the NTC Instrumentation System (NTC-IS) and its subsystems. In this article, I will identify the capabilities future C^2 systems should have and discuss how these systems could help the commander "visualize the battlefield."

In order to better understand the capabilities future C^2 systems must have, I will briefly explain the NTC-IS. The NTC-IS is composed of six major subsystems. The capabilities of two of these subsystems, the Core Instrumentation Subsystem (CIS) and the Range Data Measurement Subsystem (RDMS), could be applied to future digital systems. The CIS is the networked computer system that performs real-time data processing, including position location, direct fire event pairing, and indirect fire processing. The distinguishing characteristic of CIS is its real-time interactive software. The software contains map control, graphic control measures, OPFOR and BLUEFOR symbology, audio control, and E-mail capability. The RDMS provides position location and firing data that includes player unit identification, location in UTM grid coordinates, aircraft altitude, and time of a position fix for each player unit. These two subsystems are the backbone of the NTC-IS and enable the observer controller to rapidly analyze the cause and effect of each battle and provide near real-time feedback to the player unit leaders.

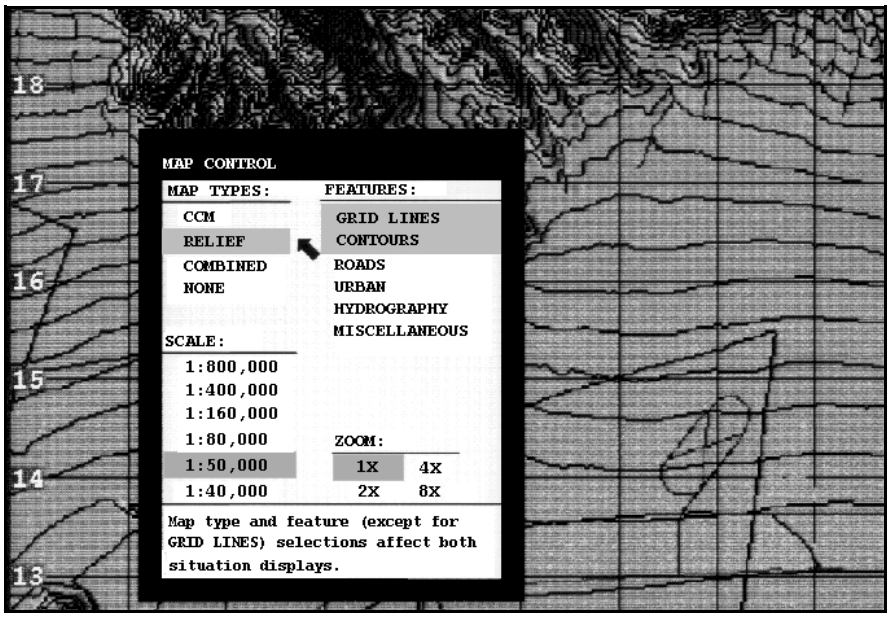

Figure 1. Map Control function allows operators to select map type, scale, feature and zoom.

To revolutionize the way we plan and prepare for missions on the future battlefield, we must eliminate the time-consuming way we pass out information from higher to lower with paper copy OPORDs and acetate graphics. Our future C^2 system must be powerful enough to accomplish this. It must have a map capability that can be updated for any location in the world, include standard Army map scales from 1:25,000 to 1:250,000, be able to zoom in and out from 1X to 8X, and include both grid and contour lines (Figure 1). The future system should have a limited word processing and E-mail capability to send messages, standard reports, and OPORDs/FRAGOs/WAR-

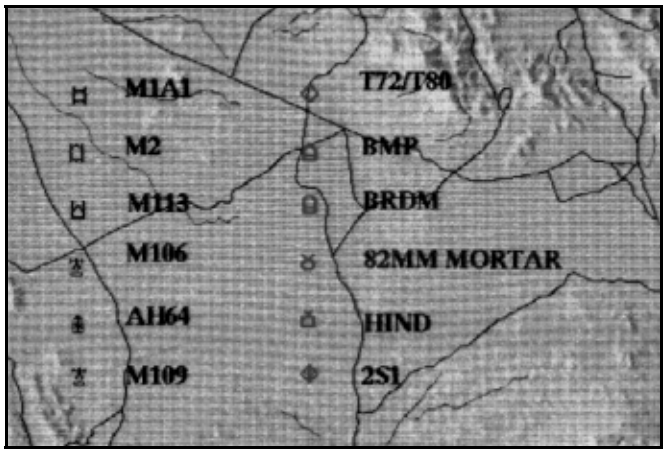

Figure 2. Symbols and graphics show up on the screen just as they appear in our current doctrinal manuals.

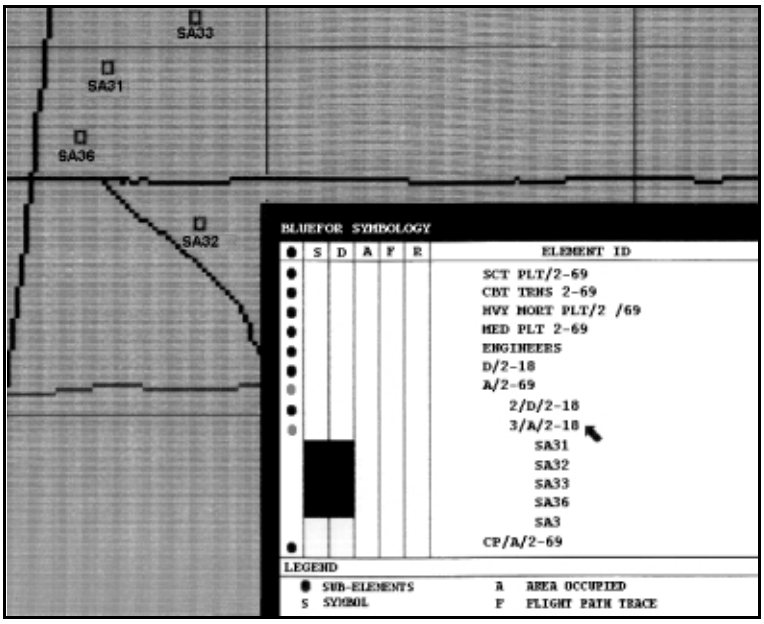

Figure 3. BLUEFOR symbology function allows operators to selectively display any or all friendly vehicles.

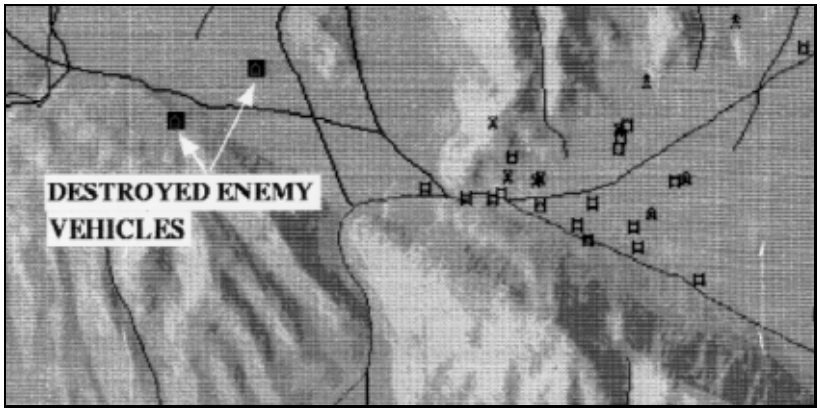

Figure 4. Vehicle and aircraft commanders can "blackbox" enemy vehicles that are destroyed to visually display battle damage assessment (BDA).

NOs. The system should include a full complement of graphic symbols straight from FM 101-5-1 (both enemy and friendly) (Figure 2). Graphics should be entered into the system at the appropriate level from top to bottom and must allow a unit/vehicle to display any BLUEFOR graphics in the file. A free-draw light pen capability would allow the user to enter graphics quickly and accurately.

All combat vehicles and aircraft should have a GPS-initialized, POSNAV-fed position locator that is tracked by satellites or mobile locator stations through triangulation. These stations could be mounted in either airborne or vehicular platforms. For situational awareness, each unit/vehicle should be able to selectively display any or all friendly vehicles and aircraft from platoon to corps level (Figure 3). Each combat vehicle and aircraft should also display a "firing vector" when firing to allow the commander and staff to observe the volume of fire in their unit. Units must also have the capability to "blackbox" friendly vehicles once destroyed by the enemy to visually show current strength. Enemy vehicles should be in two colors, yellow for templated and red for actual/confirmed locations. The G2/S2 at each level prepares a situation template in yellow and once confirmed by our intelligence systems, the G2/S2 changes the color of enemy vehicles to red and this appears on every computer screen instantly. The system on our direct fire vehicles and aircraft (tanks, IFVs, attack helos) should have a laser capability like IVIS with one improvement. Once an enemy vehicle is lased, the TC/BC should be able to select an enemy icon (T72, BMP, BRDM, etc.) to appear in red on the computer screen. Vehicle/aircraft commanders must also be able to blackbox enemy vehicles that are destroyed (Figure 4). The G2/S2 can use this to determine BDA, confirm the sittemp, determine enemy courses of action, and thus advise the commander better.

There are several hardware requirements needed for our future C^2 system. There are two types of computer systems: one basic system for combat vehicles and aircraft that is hardened, has a small screen, and does not have a print capability; and one advanced system for command and control elements that has a big screen (30" or larger), a small color printer, and a large color printer (3′ x 5′). Combat vehicles should also have a flat panel computer display that is movable and allows the

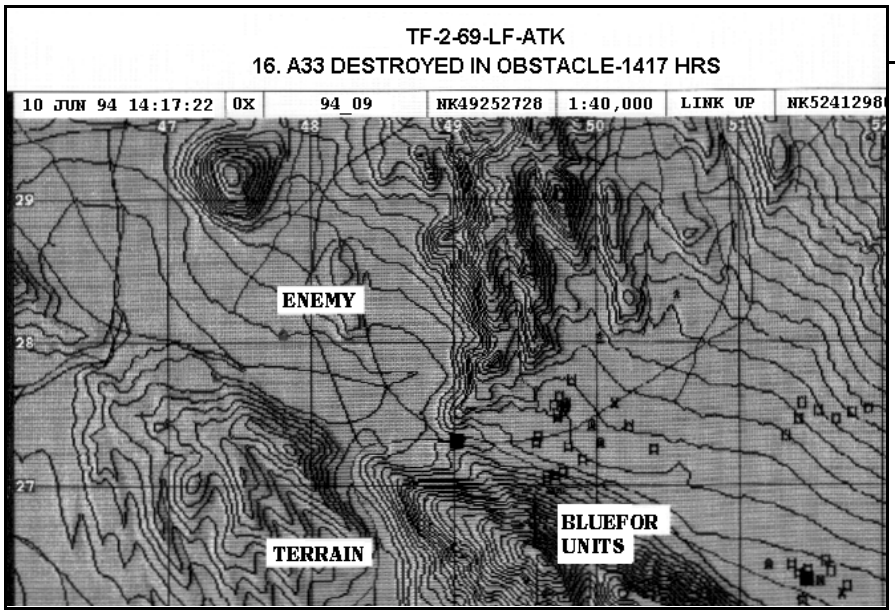

Figure 5. Commanders at all levels will be able to see the enemy, the terrain, and their unit, and the relationship of all three.

vehicle commander to view the screen while fighting from outside his turret. Finally, all of the digital information must be sent and received using a separate digital radio that does not interfere with voice traffic. With advances in technology come changes in organizations and tactics, techniques, and procedures. This new capability forces us to look at new ways to operate. Every combat vehicle (to include scout, ADA, engineer, artillery, mortar, chemical, etc.) should have a basic computer system. The TF TOC should have three advanced computer systems (S3, S2, FSE). The CTCP and field trains CP should also each have an advanced computer system. Each staff section would display the graphics and symbols necessary to track its part of the battle. During battles, each would track the battle "real-time" without the need for maps, acetate overlays, and having to move map symbols. The staff could then analyze the battle from their BOS perspective to help the commander "visualize the battlefield." The commander can fight out of his tank/IFV or a BCV-type command and control vehicle. This dynamic system will automatically update its screen with new friendly and enemy information, allowing the commander to see the enemy, the terrain, and his unit, and the relationship of all three at the same time (Figure 5). This type of accurate visual information will enable the commander to make the right decision with regard to maneuver, fire distribution, commitment of forces, and use of combat multipliers — and he can access this information from his computer without having to talk to any of his subordinate commanders or staff (he does not have to ask for anything!).

The future C^2 system will enhance the way we conduct our orders process. For example, brigade would call the task force to tell them that brigade graphics and OPORD are in the computer. The TF TOC would display the brigade graphics and print out a large graphic picture in color and the OPORD on 8½ x 11" paper minutes later. The staff would use the large picture with brigade graphics (to include intel, fire support, engineer, and CSS) to conduct mission analysis, COA development, and wargaming. Once the commander decides on a course of action, the staff would complete the OPORD, input the TF graphics and OPORD into the computer, and notify co/tms and slice. Co/tms and slice would display the TF graphics, print out the OPORD, and begin their orders process. Co/tm and slice commanders will still go to the TOC for OPORD briefings and face-to-face guidance, while their XOs plan concurrently. With this technology, the staff and commanders will be able to access higher echelon plans and orders, giving them the ability to conduct concurrent planning at all levels. One change this future C^2 system requires is that the co/tm XOs can no longer fight from a combat vehicle. They must process information and run the co/tm command post (CP) as they do in cavalry troops. Co/tm and slice CPs would have an advanced computer system, along with both a large and small printer. Once the co/tm OPORD and graphics are complete, the XO inputs them into the computer. OPORD/overlay distribution is simplified at all levels because graphic pictures and OPORDs can be printed for each leader in the unit, quickly and accurately. Leaders can use this graphic picture (showing friendly graphics, enemy sittemp, indirect fire plan, engineer obstacles, and CSS plan) for planning and rehearsals. This also eliminates the need for manual production and distribution of OPORDs and acetate graphics.

I have only scratched the surface with the capabilities a future C^2 system like the one I have described can provide to BOS synchronization during all phases of mission planning, preparation, and execution. I have described the capabilities our future digitial command and control systems should have. Our current C^2 systems are cumbersome, and fail at their primary task — to help the commander "visualize the battlefield." Future systems must help the commander see the enemy, see the terrain, and see his unit at critical points during the battle so he can make the right decision to positively influence the outcome of the battle. As witnessed during Rotation 94-07, IVIS and B^2C^2 are a step in the right direction, but our future digital systems must be improved to truly revolutionize the way we fight.

Major Tim Cherry was commissioned in Air Defense Artillery from Florida State University in 1979. A graduate of ADOBC, AOAC, and CGSC, he served as a SHORAD platoon leader, XO, asst. S3, and C Battery commander with 1-59 ADA; as asst. S3, adjutant, B Troop commander, and regimental asst. S3 with 3d ACR; as brigade asst. S3 with 5th ID and squadron S3 with 2d Squadron, 1st Cavalry; and most recently as the senior battle staff analyst for the Armor Task Force Training Team (COBRAs) at the National Training Center. He is currently the XO/CSS trainer for the Armor Task Force Training Team.