

# Army maneuver control system uses "bottoms up" evolutionary approach

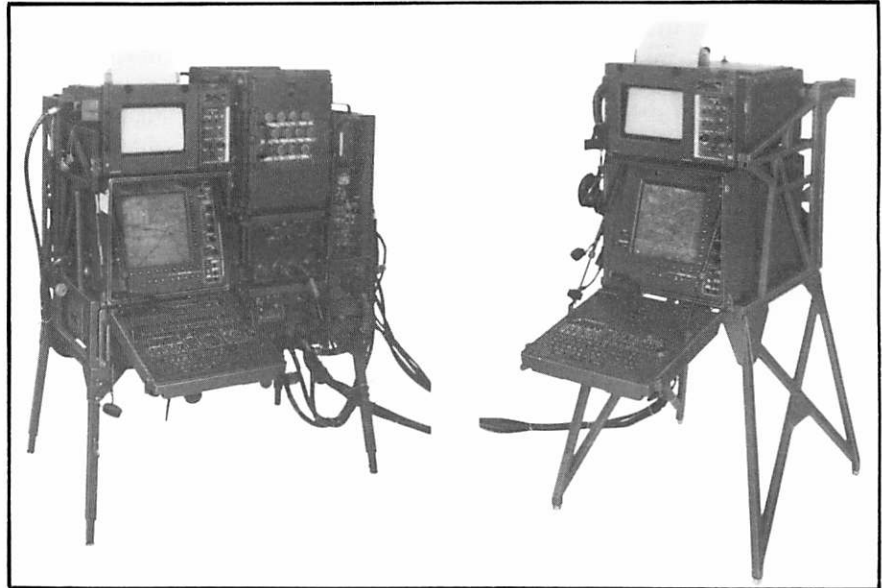
The U.S. Army's Maneuver Control System (MCS) is a composite of hardware, software, procedures and personnel that augments the Operations Officer's (G-3/S-3) ability to effectively employ battlefield resources by providing a powerful capability to evaluate, decide, and execute. As a tactical operations decision support system, the MCS facilitates the collection of battlefield information, the manipulation and interpretation of the data to develop alternatives, and the derivation of a decision. The thrust of this capability responds to a need to rapidly allocate combat power, develop situation assessments, process and disseminate information and insure reporting.

The Maneuver Control System integrates operational control from corps to battalion — its development is being managed by the Army's Project Manager, Operational Tactical Data Systems (PM-OPTADS) at Fort Monmouth, NJ. The Army began MCS with mature hardware, the Tactical Computer System (AN/UYQ-19) and Tactical Computer Terminal (AN/UYQ-30) manufactured by the Singer Co., Librascope Division, Glendale, CA, assembling an initial set of automated tools by which the experience, combat training and problem solving strengths of commanders and operations staff could be multiplied, while also being studied and improved.

## Field requirements

The automated tools of the Maneuver Control System are envisioned to provide ground combat operations facilities with:

- Familiar representations in graphics, charts, overlays and reports designed by real users.
- Expanded staff memory in a powerful data base system with immediate updating of reports.
- Enhanced information processing with data base exploration by sorting, comparing and selecting data.



- Operational simplicity suited to variable skills, style and knowledge using menus, friendly features and error tolerances.

- Man control that supports but does not constrain the operations officer in conducting analyses.

- Interoperability in an integrated information system with communications management and control.

The Army project manager added a firm design philosophy for MCS development requiring it to be a flexible, modular system that would grow in capability while accommodating change and accepting the insertion of new technologies, yet simple to operate and maintain.

## Evolutionary growth

Recognizing the complexity of command and control system development, the full Maneuver Control System was viewed as a system whose capabilities would have to gradually converge to the full requirements for battlefield decision making. To insure the convergence, a set of guidelines was established for the program:

- Continuously involve the true field user to validate each requirement.
- Provide an absolute minimum of essential functions as the first step.

Tactical computer system (TCS) AN/UYQ-19 (left); and the tactical computer terminal (TCT) AN/UYQ-30.

- Field, evaluate and stabilize the baseline and each additional increment of capability before adding additional functions.

- Insure that the system will absorb technological improvement and accommodate doctrinal change as it evolves over time. The system must gracefully accept hardware and software upgrades as the technology improves. Since the addition of more powerful processing capability is closely coupled with doctrine, design requirements will change with increased field use.

## Bottoms up approach

In 1980 the Army established a minimum baseline capability in USAEUR VII Corps using existing standard militarized computers, the Tactical Computer Terminal. Following the stated guidelines, the program first used the simplest possible baseline functions which comprise any command and control system, report/order generation and communications interfaces. The USAEUR

system included German National Communications (DBP) and Tactical Satellites as well as multichannel, switched circuits and combat net FM radio. From the beginning, capability included extensive automated assistance in the preparation of maneuver control orders and reports. User feedback from the initial field exercises led to changes in report formats while software improvements added limited information retrieval to permit users to selectively recall orders and reports on high speed tape cassette units.

In the next series of field exercises the Army introduced the Tactical Computer System. The TCS is a militarized, compact, general purpose data processing, display and communications system designed to facilitate the collection, generation, review, analysis, and distribution of tactical information. Its capabilities include: computation; data entry; message composition and editing; validation; processing; storage; display/printout; transmission and reception; and net monitoring of digital and voice messages over a wide variety of existing and planned Army tactical communications equipment.

The TCS is modular in both hardware and software. Hardware modularity is achieved by a physical partitioning of the system into separate modules, each with functional sub-modules that may be omitted or retained. It is this basic modularity concept that adapts the TCS to technological evolution of the Maneuver Control System and future Army C<sup>3</sup> networks. In the MCS, the TCS operates with the Tactical Computer Terminals by exchanging information through deployed communications networks thereby achieving a robust and flexible tactical C<sup>3</sup> system. Both TCS and TCT are extremely rugged and designed for battlefield survivability in a cold, open environment, in the vibration and shock of armored command vehicles, or in the hot, humid and wet spaces of tropical command posts. The success of the second set of field exercises attested to the reliable performance of the TCS/TCT and led to the next important step of approval for production and fielding throughout the Army.

#### **First production**

The TCS and TCT entered the hardware production phase in the summer of 1983 with several changes in the technology. The TCT was upgraded to incorporate a new microprocessor, the Motorola MC68000, that would allow use of the U.S. Department of Defense's new standard Ada software language (*DSR* Oct. '83). A new flexible disk random access memory device was also added to the TCT. The new TCS modules were a militarized version of the Rolm 1666B general purpose computer and a magnetic bubble memory with storage capacity of 8 megabytes. Both new memories are portable and used interchangeably with the TCS and TCT.

Concurrent with the start of TCS/TCT production the Army began development of the next increment of software for the Maneuver

Control System that will take advantage of the Ada language and also incorporate a data base management system using the new hardware capabilities.

In the field, Army users are continuing to provide desired changes in requirements while gaining valuable experience in operations with the initial system. The Army development community is also deeply involved in analyzing the new requirements and experimenting with other interfaces to obtain the kind of interoperability needed among all the battlefield C<sup>3</sup> systems under the aegis of the Army Command and Control System (ACCS) program.

For more information on the system: Singer Co., Librascope Div., 833 Sonora Ave., Glendale, CA 91201-9279; (818) 244-6541; TWX: 910-497-2266; Telex: 674912.

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