Space Power Is Land Power

The Army's Role in Space

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The views expressed in this article are the author's and are not necessarily those of the Department of the Army, the Army War College, or the Command and General Staff College.
—Editor

The Unified Space Command was activated on 23 September 1985. The Air Force Space Command was proposed as a base organization for the new command which is composed of

The US Army has several initiatives under way to determine requirements for using the new high ground—space. Although once a leader in space-related research, the authors feel the Army is currently behind the other services in this area, an area that may prove vital to success in future conflict.

elements from all three services. The new command has the potential charter to coordinate joint operational space activities to ensure satisfactory on-orbit control, battle management, satellite communications links, tasking and protection of the multiservice space systems. The Air Force and the Navy have the fundamental organizational structure and the inventory of trained personnel to aid in the transition to the new organization. The Army has not been as involved in this area. Historically, the Army has been a customer/user of space systems. This approach served the Army well during an era in which applications of space systems were being formed and tried, but the era of maturity for Army space action has arrived.

To adequately satisfy the requirements of operational and tactical commanders, future space systems must be tailored, available, dedicated and operated to support the AirLand Battle mission. Measurements of land power must take into account all of the geographic features, installations and technologies (weapons, sensors and their support systems) which enable a nation to use force on land. Any technology which plays a role in this exercise of land power, land-based or not, is an instrument of land power and, when incorporated into the commander's force structure, may have a far-reaching effect on land force operating capabilities.

The commanders on the ground cannot afford the interruption of the vital information and data flow nor be denied the use of space defense to support battle plans. The full range of beneficial space operations must be available to Army commanders to capitalize on all combat assets.

Army space operations are those actions and activities performed using space systems to accomplish the space missions of force enhancement, space support and space control. These space missions, when combined with the five battlefield functional areas of maneuver control, fire support, air defense, intelligence and electronic warfare, and combat service support, provide operational and tactical commanders with significant force multipliers to win the AirLand Battle of the future. This integration provides the foundation for greater potential for Army 21. The newly created Army Space Council is coming to grips with this challenge and is seeking to establish policy and define responsibilities. The goal is the system integration of space support for the modern operational commander.

The Soviets in Space

The Soviet space program traces its roots to the active postwar exploitation of German rocket developments. The most notable achievement of this program was the 4 October 1957 launch of the *Sputnik I* probe, followed by the successful launch of *Sputnik II* on 3 November 1957. A scant four years later, the first Soviet-manned mission heralded the entry of man into space. Doctrine paralleled technology, and Soviet planners were quick to realize that the military exploitation of space offered

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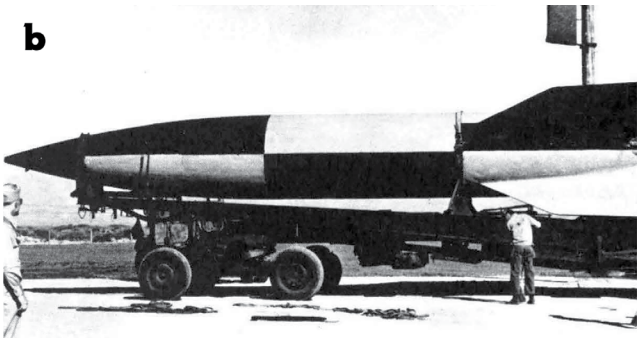

(*a*) Dr. Wernher von Braun (left) and brother, Magnus, inventors of the *V2* rocket, after surrendering to Seventh Army troops, 3 May 1945. They fled with rockets, papers and other scientists before their exper-imental station at Peenemunde was overrun by Soviet forces; (*b*) One of von Braun's *V2s* at the Army Ordnance Proving Ground, White Sands, New Mexico; (*c*) Army *Redstone* rocket hurtles first *Mercury* astronaut, Alan B. Shepard, into space, 5 May 1961; and (*d*) *Redstone* rocket being lifted into position by soldiers of 40th Artillery Group, Eckwiler, Germany, 4 December 1958.

significant potential for achieving national goals. It was not surprising, then, to find that nearly 80 percent of the Soviet space program had a military application.[1]

In recent years, a focus of Soviet space architecture has been to provide space support to operational commanders. The elements of this support have been characterized by:

- Target location, identification and characterization.
- Order of battle data.
- Force deployment/maneuver monitoring.
- Situation assessment.
- Geodetic information for tactical nuclear targeting.
- Mapping and positioning.
- Communications.
- Meteorological support.[2]

The Soviets perceive that future combat will place great stress on existing command, control, communications and intelligence systems. This will be particularly true when the integration of the operational maneuver group concept into current doctrine is complete. The space support program is to provide effective real-time assistance to the Soviet commander in the accomplishment of the operational/tactical mission. This is illustrated by reports that Soviet advisers used space assets to inform Egyptian planners of Israeli intentions and unit dispositions during the 1973 Arab-Israeli War. There are indications that orbital systems have been used to plan and conduct combat operations in Afghanistan, as well as to provide the monitoring of US exercises in Europe and the Middle East.[3]

Future Soviet space system developments are aimed at new military capabilities. The principal elements in this evolving program are reusable space vehicles similar to the US space shuttle and heavy lift boost vehicles. In conjunction with low Earth orbit manned missions, these developments are likely to lead to the establishment of a permanent manned orbital platform. It appears that the Soviets have focused on the militarization of space. Their goals, although not public, can be identified as:

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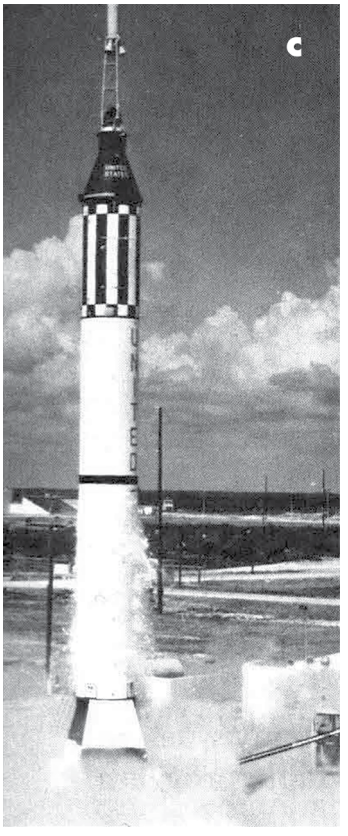
- Increase the space system support to operational and tactical commanders.



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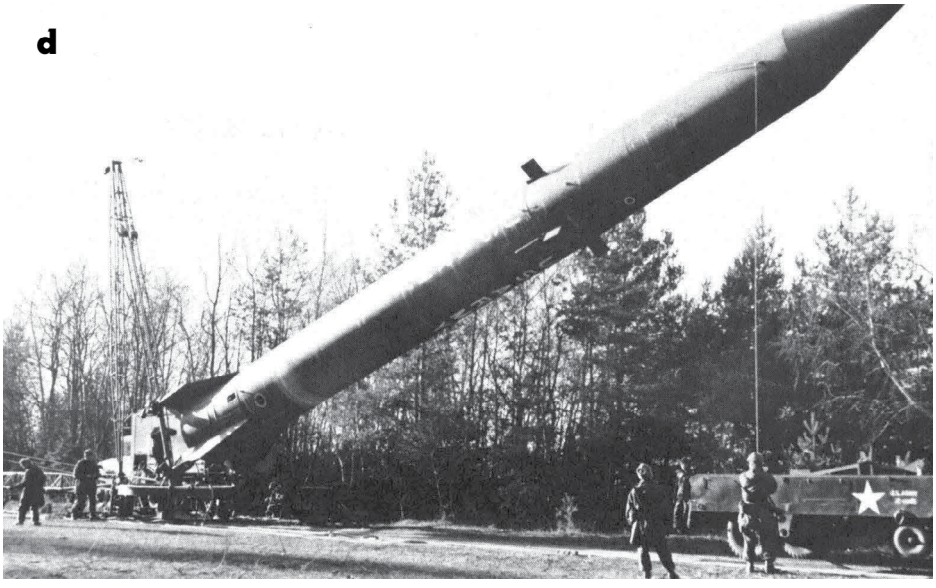

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- Enhance the strategic capability of the Soviet Union.
- Continue the evolution of offensive capabilities.

The US Army in Space

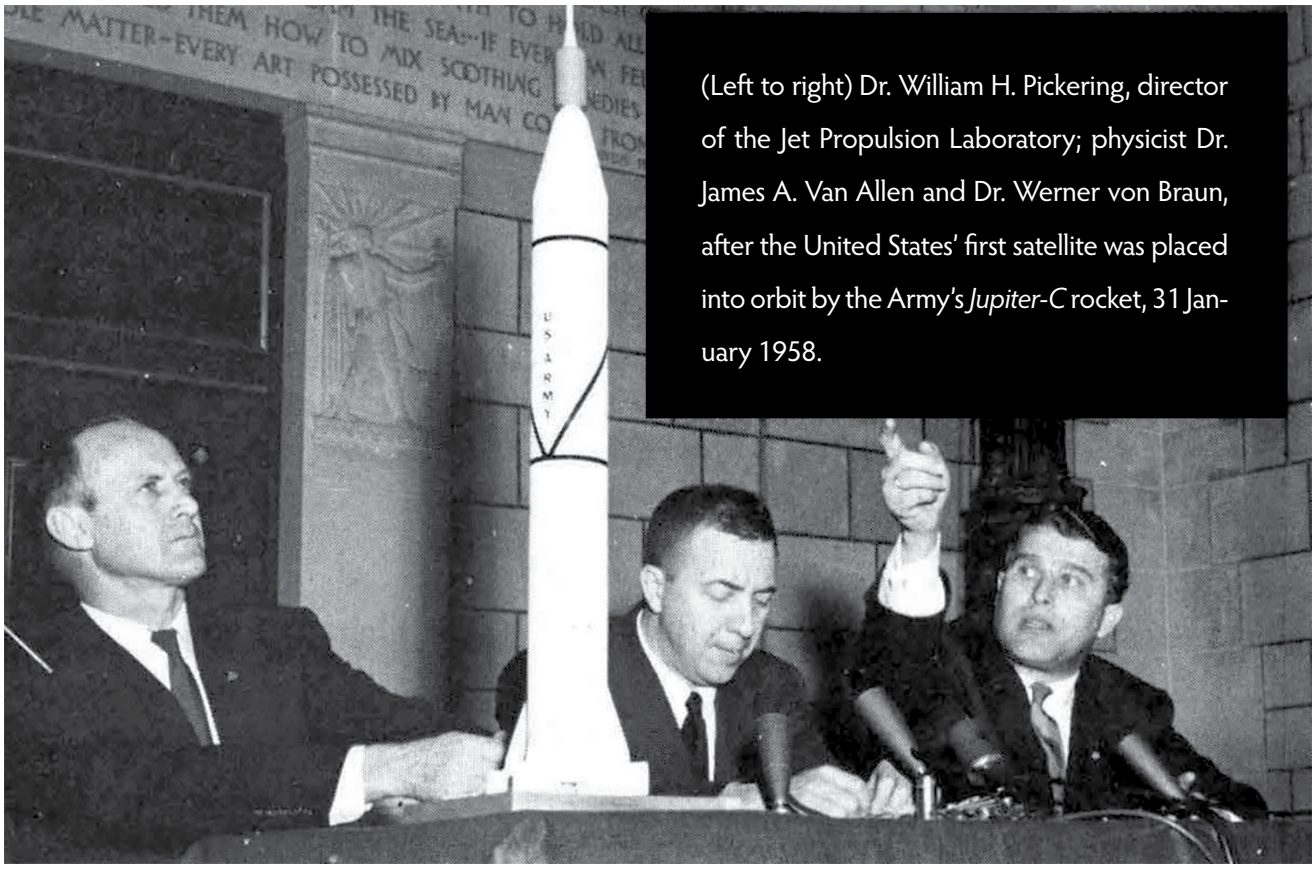
The Army has been no stranger to rocketry and has been an active participant across the broad spectrum of space-related activities. Over the past four decades, the Army has changed from a pioneer service to a service with less than clear goals, a fragmented, organizational approach and no formal space policy.

The baptism of the Army in space-related research and development occurred because of the significant threat from German rocket advances. The long-range *V2* rocket sparked concern over the vulnerability of the Continental United States. Further improvements in the German system could potentially leave US cities to the fate of the major cities of Great Britain. This concern was manifested in a study which concluded that the best defense against the *V2* was to prevent its launch. The Army, by virtue of its continental defense mission, became the primary ballistic missile defense (BMD) player.

The surrender of Dr. Wernher von Braun and his staff to the US forces in 1945 provided an insight into German developments and gave access to a mature rocket technology. The expertise of von Braun and the subsequent exploitation of German developments marked the formal beginning of the US Army's space research involvement. Early experimentation with the captured equipment occurred in late 1945 at isolated areas of Fort Bliss, Texas. This research continued until 1950 when the facilities were moved to Redstone Arsenal, Alabama, for more advanced work concerning the development of medium-range rockets.

The fear of parallel Soviet advances in rocket systems motivated continuing research in BMD. In 1955, the Army became involved with the *Nike II* study that attempted to define a common missile with variants for both antiaircraft and antiintercontinental ballistic missile missions. This effort's product was the *Nike Zeus* antiballistic-missile system.

A 1956 reorganization brought Redstone Arsenal under the control of the newly created US Army Ballistic Missile Agency. By the end of the decade, the US Army launched the first US satellite, *Explorer I*, discovering the Van Allen radiation belts. Manned missions, supported by the Army, lifted the first two astronauts into space aboard Redstone Arsenal's *Mercury-Redstone* missiles.



(Left to right) Dr. William H. Pickering, director of the Jet Propulsion Laboratory; physicist Dr. James A. Van Allen and Dr. Werner von Braun, after the United States' first satellite was placed into orbit by the Army's *Jupiter-C* rocket, 31 January 1958.

In spite of these prestigious successes, the National Aeronautics and Space Administration and the US Air Force were selected by the Department of Defense as the agencies to develop and operate future space systems. After that, the Army played a minor role in space activities, with two notable exceptions. The Army was the forerunner in developing a viable program for the operational or tactical use of space systems. These efforts established the requirements and operating procedures necessary to effectively provide AirLand Battle support. The other exception was in satellite communications where there was a defined need for reliable and flexible command and control systems at the operational and tactical levels.

The Army BMD program continued to evolve along with changing conditions of international policy, public awareness and funding. The current interest in the Strategic Defense Initiative (SDI) provides impetus in the area of BMD. This national level motivation outlines the role for the Army in, at a minimum, the ground-based portion of a space-based defense system.

While the intricacies of SDI and BMD are beyond the scope of this article, it is sufficient to note that Army BMD program funding represents approximately 40 percent of the initial SDI budget. This participation in SDI research will continue to provide opportunities for the Army to evolve as a viable partner in the development and use of future military space systems.

Future mid to high-intensity-level battles will extend over greater distances, experience a higher degree of sophistication, have higher volumes of fire and may continue longer than any military operations in history. The Army must plan for these challenges. When conducting operations anywhere on or near the Earth, the commander must secure the initiative as early as possible and exercise it aggressively. He can accomplish this by employing the tenets of AirLand Battle doctrine—initiative, depth, agility and synchronization—and employ all of the assets within his grasp.

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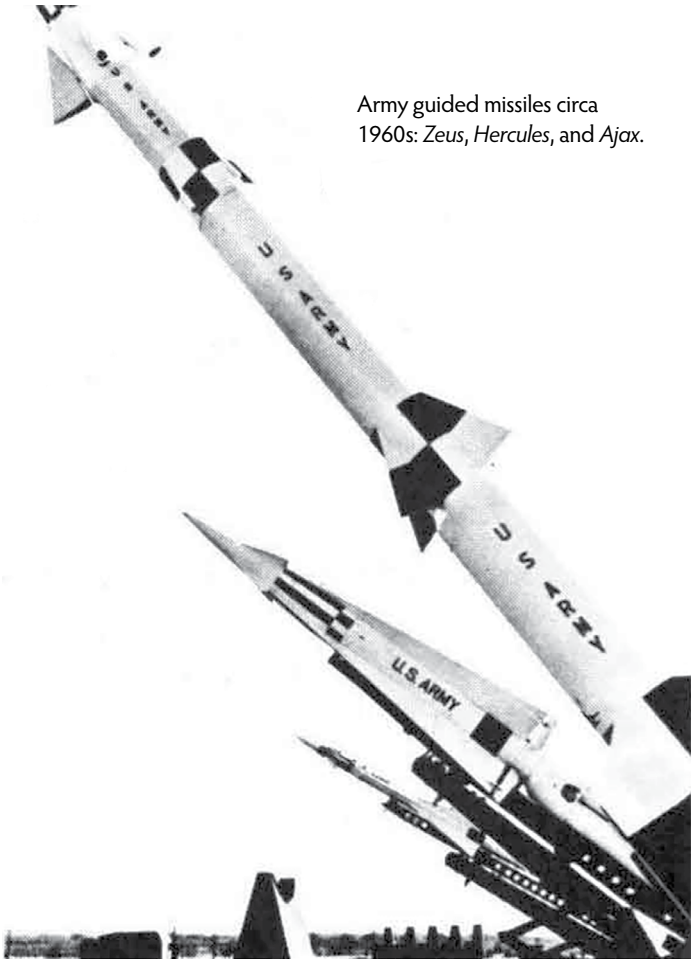

Army guided missiles circa 1960s: *Zeus*, *Hercules*, and *Ajax*.

A thorough understanding and application on the battlefield of each of the functional areas—maneuver control, fire support, air defense, intelligence and electronic warfare, and combat service support—contribute to the Army's principal charter of conducting ground operations in support of US national security interests.[4]

AirLand Battle Functional Areas

AirLand Battle functional areas provide the commander with the tools to conduct the full range of operational and tactical operations on the modern battlefield. There are near and midterm implications of developing and integrating Army space systems in support of these functional areas.

Maneuver Control

Space assets benefit the commander and operational/tactical units through accurate geolocation, tracking and navigational feedback in real time. The commander's information update and the control of maneuver actions are greatly enhanced by space systems capabilities providing the much-needed close coordination and responsiveness between the commander and subordinate units. Command and control from space assets offers additional benefits by providing the commander with a clear picture of the battlefield and the timely recognition of critical events. This permits the commander to avoid enemy strengths while taking advantage of threat weaknesses.

Real-time command and control from space gives the commander a clearer understanding of the mission objectives which are essential in exploiting AirLand Battle tenets. In the context of AirLand Battle, Army participation in space operations is essential to gain full command and control on the battlefield.

Communications space systems provide the potential for lightweight, mobile, ground networks by decreasing the requirement for vulnerable ground support equipment. This enhances friendly force mobility, is more cost-effective, improves the capability for greater communications security and provides wider access to ground forces spread over the battlefield, to include special operations forces.

The use of space assets for engineering operations support surfaces in the geopositioning and identification of enemy countermobility operations. The support of current and future operations rests with the capability of orbital systems to perform terrain analysis, geodesy and topography. These efforts serve the engineer and the commander by expanding engineer support to offensive or defensive battle plans.

Nuclear, biological and chemical (NBC) operations support in the defense enhances the capability to avoid contamination, to identify other potentially contaminated areas and the level of contamination, and the potential for early warning of NBC attacks. Space surveillance techniques could provide an improved countermeasure to threat smoke use and render it ineffective over the operations area. In the

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offense, space assets can provide the assessment of specific NBC agent applications versus the prediction of weather and terrain conditions best suited for employment under those circumstances.

The difficulties in providing secure, reliable communications between special operations units and their headquarters, as well as national authorities, would greatly alleviate command and control problems in remote areas. Space assets would also support these operations in the geopositioning and navigational roles more rapidly and responsively. This could include passage of vital intelligence and target acquisition information for small-unit operations.

Fire Support

Space assets benefit fire support by providing a continuous, around-the-clock target acquisition capability regardless of environmental conditions. Space systems can also supplement ground systems in guiding smart weapons to high-value targets in the deep attack.

Tactical Communications

Space can enhance the air support of the AirLand Battle by providing the capability for long-range, secure communications to aircraft in all missions, including nap-of-the earth flying and joint air attack team (JAAT) missions for the deep battle. Space system support of air missions can include navigational aids; target-designation capabilities for close air support, battlefield air interdiction and JAAT attacks; and air-traffic management of crowded air space over the battlefield. Additionally, the potential exists for solving the identification friend or foe problems inherent in the Army air defense artillery mission.

Air Defense

Space-based detection and early warning capabilities can identify and report threat aircraft and cruise missiles entering the area of interest. Satellite monitoring systems greatly improve fire control capabilities while decreasing the electronic signatures which will flood the future battlefield. Developmental contributions from the BMD and SDI programs will provide the potential for vast improvements in these areas.

Additionally, a degree of autonomy and protection of Army space systems derived from these programs enhance the Army's chance of supporting the commander through the synchronization of available assets. This protection includes both passive and active measures, the redundancy of assets and rapid replacement capabilities. The commander should have the capability to neutralize threat space assets to protect the ground forces and ensure friendly asset availability when needed.

Intelligence and Electronic Warfare

This is a functional area where the commander in any future conflict may derive valuable benefits. These benefits, mainly at the corps level, may come in the form of improved capabilities to provide and process information from a designated named area of interest. These systems will permit the rapid collection, fusion and dissemination of vital information and data for the intelligence preparation of the battlefield plus necessary weather reporting and predictions. Additionally, these space support systems offer a potential electronic warfare opportunity to the commander in operations against second and third-echelon threat forces when there are insufficient deep battle assets to engage them.[5]

Combat Service Support

The benefits derived from geopositioning and location requirements in combat service support operations aid in the rapid and accurate distribution of logistical supplies.

It would provide for responsive and accurate logistical support requests, planning, directing, processing and delivery, as well as forecasting requirements for combat service support.

The Army's ability to carry out its charter depends increasingly on the imaginative integration of space assets into these battlefield functional areas and the vision to identify unique uses for future space systems. Three space missions offer the greatest opportunity for the Army to meet this challenge. . . . Force enhancement. . . . Space support. . . . Space control. . . .

Space Missions

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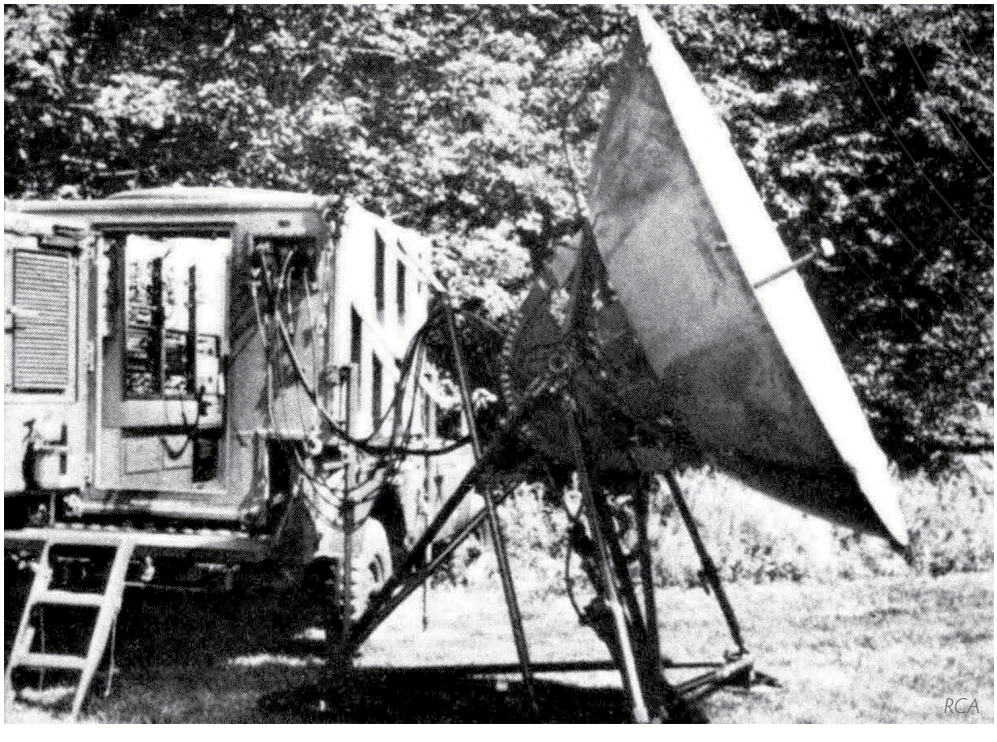
Three space missions offer the greatest opportunity for the Army to meet this challenge. These three space missions are:

- Force enhancement—the use of space assets to support the operational and tactical commander.
- Space support—the activities involved with deploying and sustaining Army space systems.
- Space control—operations conducted to ensure the freedom of access to the extraterrestrial environment for Army space systems with the simultaneous denial of the same environment to the threat systems.

This area of space applications is a rapidly evolving arena, and future analyses are likely to produce changes in the precise wording of these definitions. However, the fundamentals and their potentials remain unchanged. These three Army operational missions for space systems outline the current and future uses of space to support the Army's charter.

Battlefield Surveillance



Force Enhancement

The Army's AirLand Battle doctrine characterizes the future combat environment as intense, deadly and costly. To win, "we must retain the initiative and disrupt our opponent's fighting capability in depth with deep attack, effective firepower, and decisive maneuver."[6] This concept is embodied in the AirLand Battle tenets of initiative, depth, agility and synchronization.

AirLand Battle doctrine vastly extends the battlefield for the commander. The corps attempts to gain surveillance of an area of interest large enough to see the approach of threat forces. The area of influence extends far enough beyond the forward line of own troops, permitting the corps to engage enemy units capable of attacking within approximately 72 hours. This accomplishment is a function of the capability to provide the real-time fusion of friendly and threat information and the control and execution of decisive maneuver.

A goal of the doctrine is to reduce friendly planning and execution time to "turn inside the enemy's decision/execution cycle." The pace of the deep attack, close-in battle and rear battle dictate that these requirements be satisfied simultaneously. Current technology available to the corps and echelons above corps is not sufficient to accomplish this difficult task. The principal deficiencies are identified as response time, acquisition and command, control

and communications (C^3) range, and limitations in the capability to distinguish high-value targets from many available targets.

These deficiencies are alleviated by current and evolving space-related technologies. Space systems offer extension of the range and perception of intelligence acquisition, in addition to enhancing the C^3 of offensive and defensive operations. Space systems offer the operational and tactical commander the opportunity to balance AirLand Battle requirements with system capabilities.

Space Support

The space support mission is a combat support mission involving prelaunch preparations as well as the activities involved with deploying and sustaining Army space assets. It encompasses management, planning and operations support activities such as trained personnel to operate the systems, defined safety measures to safeguard people and equipment, an educational program to ensure the technical competence of the personnel and a logistical support base. The activities in this definition include capabilities for active involvement in space launches, the recovery of specific Army space assets and the preparation, buildup, launch, deployment and use of the Space Transportation System.

This space mission is the most logical second priority for Army involvement because it can directly support the ground commander's mission in the near term. It can be supported by training programs more quickly, and the Army is becoming more active in this arena each year. The Army is participating in the astronaut program, in flight and payload integration involving the Space Transportation System, in BMD research and development activities, in Space Command participation and in Army Tactical Exploitation of National Program Capabilities and Satellite Communications Agency programs.

Space Control

Space control provides freedom of action in space for friendly forces while denying it to the enemy. This proactive defense in space safeguards and ensures that those space assets available and dedicated to the battlefield commander remain intact. It embodies the idea of

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"space superiority" over the commander's area of influence just as air superiority does by employing counterair and air interdiction in airground operations. Space control, therefore, consists of two parts: counterspace operations and space interdiction.

Counterspace operations are spaceborne or terrestrial operations conducted to gain or maintain the control of space in support of Army operations. This ensures those space assets dedicated to support the Army commander have the freedom of action, throughout space, to provide that support. The action is carried out by nullifying or reducing the effectiveness of the threat's offensive and defensive space capabilities. Involving both proactive and passive defense measures, counterspace targets include space-based command and control systems, relay satellites and surface-to-space defense systems.

Space interdiction is conducted against the enemy's space lines of communication which could be used to support or participate in combat operations against friendly forces. Space interdiction includes attacking satellite control facilities, mobile ground terminals, launch facilities and space logistical and maintenance facilities. The operations also involve both proactive and passive defensive measures.

Current Initiatives

Army Vice Chief of Staff General Maxwell R. Thurman has taken steps toward identifying the Army's role in space operations by creating the Army Space Council from the Army's senior leadership. The charter of the council is to focus on the current space activities of the Army, the Army's potential role in a Unified Space Command and a future centralized Army space organization to form Army space policies, concepts, doctrine and requirements, as well as manpower, training and materiel programs. The council has identified an Army Space Working Group and its primary participants and has established a schedule for accomplishing the formulation tasks.

In addition to the aforementioned program initiatives, it began defining the Army's vital interests in the three space operational missions of force enhancement, space support and space control. In view of the Army's past efforts in space operations, the quality of these initiatives may determine the Army's future standing in space-related activities.

The significance of the Army's role in space can be derived from the gap needing to be filled in its capability to conduct, control and sustain combat forces on the modern battlefield in a mid to high intensity conflict environment. The very nature and pace of the evolution of technology and the application of space assets by the threat on the modern battlefield dictate that the US military stay in front of potential enemies in the research, development, deployment and operation of space systems. Anything less will quickly show in shortcomings to fight and defeat the enemy using all available means while denying the same to him.

The Air Force and Navy are fully committed to the establishment of a viable set of programs directed toward supporting their combat forces by applying and controlling space assets, but the Army has been constrained by its inability to envision a role for itself. The Army failed to recognize the advantages of using and controlling space assets as a combat multiplier and the requirements definition process for integrating Army space systems into the force structure.

The most recent direction from the council to try and regain lost ground surfaces in the form of two very important near-term initiatives:

- The acquisition of the talents of the Rand Corporation provides the repository of technical expertise to guide the Army toward a concrete set of concepts, realistic doctrine and training milestones, and the delivery of a master plan for Army space involvement. The first of several milestones was delivered in April 1984. It constituted the expanded version of the Army's concept statement.
- The establishment of the Army Space Initiative Study Group (ASISG). This group of officers represents the core of the US Army Training and Doctrine Command's efforts to bring together talent in all functional areas of the Army to Fort Leavenworth, Kansas, for six months of intensive investigation. It

will provide guidance to the Rand study and formulate the Army's personnel and training position and space force structure for the outyears.

These efforts substantively reinforce the Army commitment to involve itself in the employment of space assets as a future force enhancement vehicle. The efforts inherent in the SDI and the Army's involvement via the BMD program forecast long-term progress in the space control mission. The mission which appears to be receiving the least attention is the space support mission. This is possibly driven by existing joint facilities which do not enjoy Army participation.

When one thinks of nonmilitary space platforms, what immediately comes to mind is a highly integrated set of space systems for sensing the Earth environment and processing and relaying information and television pictures to other space, airborne or ground-based facilities. Thus far, only the Air Force and the Navy are in a position to take full advantage of space system capabilities tailored to meet their strategic, operational or tactical requirements.

While potential applications for space may seem obvious, the number and variety of space systems used by the Army today are actually very few. Moreover, the organization and management arrangements for determining requirements and responding to them, as well as for developing and operating space systems for combat operations, require further development and maturing.

The Army's senior leadership has recognized these deficiencies and has embarked on a broad agenda for dealing with them. The work represented by the ASISG, the Rand contract efforts, the Army Space Working Group and the council, with specific objectives to develop the master plan for the use of space systems to support the operational and tactical commanders, has started. By the year 2000, the use of the space medium and the systems operated there will determine the outcome of any future mid to high-intensity terrestrial conflict.

There is no simple formula for winning wars. Defeating enemy forces in battle will not always ensure victory. Therefore, AirLand Battle doctrine is structured around a realistic framework that is designed to draw upon every device of warfare which enhances the commander's chances of winning the battles, the campaigns and the war.

Space operations assets require full integration into the Army's arsenal. Employing the full potential of space operational missions in the form of force enhancement, space support, force application and space control will be necessary to the commander when planning the implementation of all of the functional areas of combat. There must not be any gaps in operational capabilities to support the commander's planning cycle. That is why the Army must have Army space systems tailored to the AirLand Battle commander's requirements.

The Army must develop and deploy the capabilities to properly maintain operational control of Army space assets, perform the health and welfare operations on satellites and develop an active space defense force. It must also sponsor a much accelerated design and development effort directed toward supporting Army requirements for the AirLand Battle and Army 21.

Notes

1. Colin S. Gray and Barry R. Schneider, "The Soviet Military Space Program," *Signal*, December 1984, p 69.

2. James B. Schultz, "Soviet Space Operations Stress Strategic Role," *Defense Electronics,* October 1983, p 140.

3. Nicholas L. Johnson, "Soviets Scrutinize Hot Spots From Space," *Defense Systems Review,* October 1983, pp 53-54.

4. Battlefield Automation Appraisals met in 1978, 1979 and 1980 to determine how the command and control information structure should be arranged. It was also decided that the various "battlefield functional areas" be grouped into the five "nodes" listed.

5. Walter J. Moran, et al., "The Army Role in Space, (Unclassified), Group Study Project, US Army War College, Carlisle Barracks, Pa., 1984, p 36.

6. Field Manual 100-5, *Operations*, Department of the Army, Washington, D.C., 20 August 1982, p 1-1.

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