Chapter 4

SPACE OPERATIONS AND TACTICAL APPLICATION - U.S. ARMY

Fig. 4-1. SMDC

On Oct. 1, 1997, the Department of the Army created its newest major command, the U.S. Army Space and Missile Defense Command (SMDC) (**Fig. 4-1**). Composed of five primary components, the SMDC is a global organization. These components are the SMDC Headquarters and the Force Development Integration Center in Arlington, Va.; the U.S. Army Space Command (Forward) located in Colorado Springs, Colo.; and, the Space and Missile Defense Technical Center (SMDTC), the Space and Missile Defense Battle Lab (SMDBL) and the Space and Missile Defense Acquisition Center (SMDAC) based in Huntsville, Ala. Included in the SMDAC are the High Energy Laser Systems Test Facility (HELSTF), at White Sands Missile Range, N.M., the U.S. Army Kwajalein Atoll/Kwajalein Missile Range (USAKA/KMR), in the Republic of the Marshall Islands, the Army Space Program Office (ASPO) in Alexandria, Va., and the Joint Land Attack Cruise Missile Defense Elevated Netted Sensors Project Office (JLENS) and the Ballistic Missile Targets Joint Project Office (BMTJPO) which are both in Huntsville.

BACKGROUND

The SMDC commander is a dual-hatted leader. In addition to the duties of SMDC commander, he also serves as the commander of the U.S. Army Space Command (ARSPACE). The creation of the new major command and its organization are designed to align the command to reflect the importance of space and missile defense to the Army and the joint warfighter. The basic missions of the command are twofold. The SMDC ensures that the soldier in the field has access to space assets and their products. The command also seeks to provide effective missile defense for the nation and deployed forces.

Although a new organization, the SMDC is building on more than 40 years of achievement and progress in the space and missile defense arena. The command began in 1957, when the Army created the first program office for ballistic missile defense. With the Nike-Zeus, the Army explored the feasibility of nuclear intercepts of inter-continental missiles. On July 19, 1962, the command made history with the first successful intercept of an intercontinental ballistic missile. This feat was repeated at the next level in 1984, when the Homing Overly Experiment performed the first non-nuclear, kinetic-kill intercept of a reentry vehicle, proving it was possible to hit a "bullet with a bullet." In 1967, having proved the interceptor's capabilities, the command moved toward the next phase – deployment – with the Sentinel defense system. Redirected in 1969, the program was assigned to defend of the U.S. land-based ICBM's. On Oct. 1, 1975, the Safeguard Complex in North Dakota became operational. Congress inactivated the site almost immediately, because of

concerns over the budget and the influence of the Anti-Ballistic Missile Treaty. President Ronald Reagan announced a new approach to strategic planning, the Strategic Defense Initiative, in March 1983. This concept urged an active defense rather than the traditional offensive deterrence. To address this change, elements of the Ballistic Missile Defense Organization were merged in July 1985, creating the U.S. Army Strategic Defense Command (USASDC). At the same time, efforts by the command expanded to incorporate new avenues of research. In addition to radars and interceptors, the USASDC expanded its exploration of anti-satellite systems, lasers, neutral particle beams and innovative sensors. With the new decade, the command began to move in new directions. In October 1990, as part of an effort to centralize laser research, the HELSTF transferred to the command from the Army Materiel Command. The USASDC mission was further enhanced in January 1991, when the command was assigned all Theater Missile Defense functions and again in June 1994, the USASSDC commanding general was made the Theater Missile Defense advocate.

In 1992, the Army reorganized the USASDC to focus elements upon specific needs and missions. As part of this decision, several missile and radar projects were transferred from the USASDC to the newly created Program Executive Office for Global Protection Against Limited Strikes (subsequently renamed Air and Missile Defense). Among the projects leaving the command were the Ground Based Interceptor, the High Endoatmospheric Defense Interceptor, the Theater High Altitude Area Defense, the Extended Range Interceptor (which became the Patriot Advanced Capability-3 interceptor), the ARROW, and the Ground Based Radar. The Program Executive Office was assigned the mission to develop and deploy viable national missile defense and theater missile defense systems.

The Army's renewed interest in space technology was reflected in Department of the Army's decision to create the U.S. Army Space and Strategic Defense Command (USASSDC), on Aug. 24, 1992. Under this directive, the Army Space Command became a subordinate command to the USASSDC. Other Army space interests were incorporated into the new organization in later years. The Army Space Technology Research Office transferred to the command in 1993, followed by the Army Space Program Office in 1994. Based on these changes and the years of experience, the USASSDC was named the Army's advocate for Space, Theater Missile Defense and National Missile Defense. As outlined in the General Order, dated July 1, 1993, the USASSDC was to serve as the "focal point for space and strategic defense matters, … responsible for [the] exploitation of space and strategic assets for use by warfighting [Commanders in Chief]."

With this consolidated approach, the Army had teamed all of its space-related organizations. Since 1973, the Army Space Program Office has overseen the tactical exploitation of national capabilities program, or TENCAP. The TENCAP program seeks to assess the tactical potential of current abilities and integrate them into the Army system. The Army Space Technology Research Office, established in 1988, managed near and possible far-term space R&D programs. It became the core of the new Space Applications Technology Program.

The Army Space Command, created in 1986, serves as the Army component of the U.S. Space Command and is responsible for operational space planning. This command also oversees the Defense Satellite Communications System Operations Centers and the Army Space Demonstration Program, which explores the feasibility of off-the-shelf technology in the space program. One successful example of this effort is the Small Lightweight Global Positioning System (SLGR) (**Fig. 4-2**) receiver (commonly called the "slugger") used during Operation Desert Shield/Desert Storm.

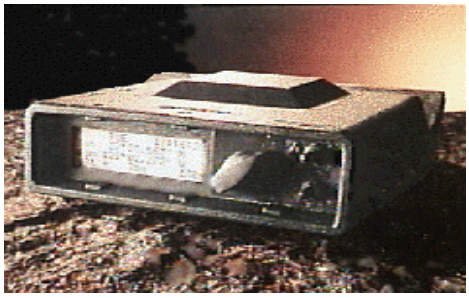

Fig. 4-2. SLGR

It is with this substantial background that the SMDC advances the Army's space and missile defense efforts towards the 21st century.

OVERVIEW

The U.S. Army Space and Missile Defense Command, a MACOM, serves as the Army's proponent for Space and National Missile Defense, and as the Army integrator for Theater Missile Defense. The command ensures that Army warfighters have access to space assets and products to win decisively with minimum casualties and effective missile defense to protect our nation as well as our deployed forces and those of our friends and allies. From its headquarters in Arlington, Va., U.S. Army SMDC oversees a number of Army elements around the globe to accomplish its challenging and diverse mission:

The U.S. Army Space Command, or ARSPACE, in Colorado Springs, Colo., serves as the Army component to the U.S. Space Command, and supports the warfighter through the 1st Satellite Control Battalion and the 1st Space Battalion. The former provides worldwide long-haul satellite communications to the warfighter through the defense satellite communications system, while the 1st Space Battalion's Army Space Support Company provides units deploying on exercises and contingency, and humanitarian operations with intelligence, planning, and operational expertise and products.

The 1st Space Battalion's Theater Missile Warning Company uses the Joint Tactical Ground Stations to provide theater CINCs with the only in-theater tactical ballistic missile warning capability on the battlefield. The ARSPACE also manages the Army's astronaut detachment at the Johnson Space Center, Houston, Texas.

The Space and Missile Defense Technical Center, or SMDTC, located in Huntsville, Ala., is the research and development element of the command. The center executes space and missile defense and directed energy research and development programs. As executive agent for DOD's Ballistic Missile Defense Organization, the center provides cost, schedule, and technical oversight for national and theater missile defense technology, and provides technical matrix support to PEO Air and Missile Defense and the National Missile Defense Joint Program Office.

The Space and Missile Defense Battle Lab, or SMDBL, in Huntsville, Ala., and Colorado Springs, Colo., links the technologist and the warfighter through experiments simulating modern "battlefield" conditions, often using sophisticated computer simulations, interfaces, and networks.

The National Missile Defense TRADOC System Manager, or TSM, in

Arlington, Va., performs the function of integrating and managing NMD user activities within the Army. It serves as a single Army user representative and advocate in the development of the land-based NMD system.

The command's Force Development and Integration Center, or FDIC, in Arlington, Va., develops the Army's space and missile defense concepts, validates requirements, and ensures Army-wide solution integration.

The Space and Missile Defense Acquisition Center in Huntsville, Ala., centralizes the command's materiel development, targets, and test facility management into one overarching organization that includes the following facilities and program offices:

- The Army Space Program Office, or ASPO, at Fort Belvoir, Va., is responsible for the Army Tactical Exploitation of National Capabilities Program – TENCAP. The program focuses on exploiting current and future tactical potential of national systems and integrating the capabilities into the Army's tactical decision-making process. The ASPO has successfully fielded more than 60 systems and currently supports 41 systems at 23 sites around the world.
- The High Energy Laser Systems Test Facility, or HELSTF, at White Sands Missile Range, N.M., serves as a national center for high-energy laser research, development, testing, and evaluation. It is the only laser facility capable of placing continuous wave megawatt laser light on a variety of targets.
- The Kwajalein Missile Range's unit geographical location in the central Pacific Ocean and unmatched suite of radars, instrumentation, and test support facilities offer extensive flexibility for ballistic missile testing and space-object tracking.
- The Ballistic Missile Targets Joint Program Office in Huntsville, Ala., provides the BMDO community with both strategic and theater missile targets for BMD weapon system developmental testing.
- The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System Project Office, or JLENS, Project Office in Huntsville, Ala., is developing advanced radar sensors that will provide over-the-horizon coverage from cost-effective aerostat platforms. The sensors are crucial for providing early warning, surveillance, and precision track/elimination of threat cruise missiles.

SPECIFIC ELEMENTS PROVIDING SPACE SUPPORT TO ARMY OPERATIONS

ARMY SPACE COMMAND (ARSPACE)

Fig. 4-3. ARSPACE

The mission of the Army Space Command, or ARSPACE (**Fig. 4-3**), is to support Army, Joint, and Coalition warfighters with space-based expertise, advice, capabilities, and products. ARSPACE is also involved in the development of technological solutions to warfighter requirements through its Technical Support Office.

Missions

- *Support the Commander-in-Chief, U.S. Space Command*. The Commander of the Army Space Command is the Army component to the unified U.S. Space Command. ARSPACE ensures that the Army's requirements are met at the joint level, while bringing the CINC's views and concerns to the Army staff. ARSPACE supports CINCSPACE in the development of Joint space doctrine, as well as the development of plans, policies, and

requirements for space support to Army operations.

- *Operate and Manage the Defense Satellite Communications System (DSCS)*. This system spans the globe to provide super-high-frequency communications to all U.S. warfighting forces — anywhere, anytime. Management, planning, and control of the payloads on DSCS satellites is ARSPACE's largest mission. ARSPACE operates and maintains five DSCS control facilities located around the world, one Ground Mobile Forces Control Center (AN-MSQ-114), and the DSCS Certification Facility, or DCF, at Schriever Air Force Base in Colorado. These facilities control the satellite links for tactical warfighter communications and strategic communications networks. They also provide payload control to the satellite and technical training and troubleshooting assistance required to ensure maximum support to the user. In addition, the DCF provides platform control, monitoring the health and welfare of the payloads for selected satellites in the DSCS constellation. Three Regional Space Support Centers perform DSCS planning and authorize warfighter use of DSCS capabilities.
- *Current Operations*. ARSPACE support of the Army, Joint, and Coalition warfighter spans the globe. Army Space Support Teams, or ARSST, provide expertise and advice and operate equipment which provides the warfighter support in the planning and conduct of the complete spectrum of today's military operations. Each of the five teams is aligned with a Corps and provides communications, weather, terrain analysis and 3-D visualization, mapping, and satellite coverage analysis capabilities to the Corps commander. ARSST are deployable to exercises and contingency operations and have supported every contingency operation since Operation Desert Storm. They are capable of sustained operation of the equipment, or they can train designated soldiers to operate the equipment.
- *Joint Tactical Ground Stations (JTAGS)*. The JTAGS capability supports forward deployed CINCs with direct downlink, from satellite to theater, of early warning of ballistic missile launches. The five JTAGS systems are a key part of CINCSPACE's Tactical Event System, are operated by joint Army-Navy crews, and provide continuous, all-weather threat monitoring. The design, development, and fielding of the JTAGS systems is an example of the Army's capability to fast track vital equipment procurement to support soldiers with the best equipment for mission accomplishment.
- *Missile Defense*. Working through USSPACECOM, the Ballistic Missile Defense Organization Joint Project Office, and the Army National Guard, ARSPACE is the operator representative on the team developing a system of defense for the homeland from a proliferating missile threat. As the eventual user and operator of the ground based portion of a National Missile Defense system, ARSPACE is playing a key role in planning and designing the requirements, Concept of Operations, and support required for such a system. ARSPACE and the Program Manager for Air Defense Command and Control Systems recently developed the overarching pro-

totype Theater Missile Defense, or TMD capability, the Army Theater Missile Defense Element, which ARSPACE fielded. This system synchronizes the four pillars of TMD: Passive Defense, Active Defense, Attack Operations, and Battle Management/Command, Control, Communications, and Intelligence. After three years of exercising and development, it was passed to the Army Air and Missile Defense Command, the system's user, at Ft. Bliss, Texas.

- *Human Exploration and Development of Space*. The Army Astronaut Detachment at the Johnson Space Center in Houston, Texas supports NASA's Space Shuttle and International Space Station Programs.

KEY ARSPACE SUPPORT ELEMENTS

ARMY SPACE SUPPORT TEAM (ARSST)

Such fundamental requirements as force projection, space intelligence analysis, communications, command and control are today dependent upon our capabilities in space. The ARSST is an element of ARSPACE task organized and resourced to support the commanders and staffs of land forces to orchestrate the employment of a complex array of dynamic battlefield resources. An ARSST complements the operational space based capabilities accessed by corps or divisions, such as TENCAP, SATRAN, topographic products, etc, used to obtain a relevant common picture of the battlefield. The team supports the commander and staff in the planning and integration of space assets into their training or military decision making process; obtains, processes and delivers space products to the supported unit; and assesses the operational impact of friendly and adversary space based capabilities. The ARSST manages these complex tasks from staff planning and the estimate process through contingency or operations execution, assisting the command and staff to integrate and focus space support on mission accomplishment. The team typically supports at the corps, and when resources are available, at the division level. Each team consists of 4-6 officers and NCOs, is equipped with a suite of unique hardware and software, possesses expertise in space applications and operational planning, and remains ready to deploy, when necessary, to the warfighter's location.

Support to the Corps staff and or Division staff is available at all times, by virtue of the habitual relationship that is maintained between each of the four ARSST and the four US Army corps. Requests for assistance from other organizations will also be met by ARSPACE as on-going missions permit. By employing state-of-the-art sensor and terrain modeling, as well as access to various web sites, ARSST can assist the staff in answering the commander's critical information requirements as well as providing input to assist in the preparation of staff estimates and OPLANs. The teams rely on the supported unit for logistical support.

ARSST Support Functions:

- *Satellite Advance Notice.* The team can aid staffs in making optimal use of Satellite Reconnaissance Advance Notice (SATRAN) data, which pro-

vides information on potential threat satellites and their capabilities to monitor friendly operations.

- *Position/Navigation.* The Global Positioning System is an essential combat multiplier, whether in the form of a PLGR in the hands of an infantryman or as a component in a weapon system. ARSST obtains and provides data on the fluctuating degree of GPS accuracy at specific locations for a designated time that will be available to friendly forces during planned operations (**Fig. 4-4**). The team can also provide advice on counter measures to enemy efforts to jam or spoof GPS.

Fig. 4-4. GPS Assistance

- *Space Weather.* There are a number of phenomena that occur on the surface of the Sun, which can have a dramatic effect on UHF and SATCOM communications, GPS signal reception and radars. The ARSST complements the efforts of the SWO by obtaining advance forecasts of these events and assessing which friendly systems will be degraded, the degree of degradation and when.
- *Imagery.* The ARSST deploys with a state-of-the-art automated data processing package to provide commanders and staffs imagery products beyond those provided by internal topographic units.

These products include: fly-throughs, 3-D images, perspective views and image maps (**Fig. 4-5**), all in various levels of resolution. Image maps provide staffs and soldiers up-to-date maps of areas where no maps exist or are out of date.

Fig. 4-5. Image Map

The ARSST can reach back to its Multispectral Imagery (MSI) Lab in Colorado Springs, which can fulfill shortfalls in additional imagery requirements, scene rectification and hard and soft copy production. These enhanced products from the lab can be shipped to the team by multiple means, such as SIPRNET, GBS, and overnight mail.

- *Intelligence Support.* ARSPACE DCSINT members provide space intelligence analysis to the ARSST. The DCSINT focus is to conduct Space Intelligence Preparation of the Battlefield, respond to space related RFI, provide assessments of how the enemy will use it's space systems, and to provide expertise on friendly force space-based intelligence capabilities. The DCSINT has a SIPRNET home page with detailed listings of threat space capabilities. Finally, the intelligence element assists the supported staff's planning effort by providing expertise on enemy and friendly availability to employ commercial satellites, enemy/friendly space vulnerabilities, and recommendations to support the targeting process.
- *SATCOM.* The team provides a limited supplement (**Fig. 4-6**) to the unit's early entry communications

connectivity using non-secure Iridium handsets, and International Maritime Satellite (INMARSAT) hand-carried terminals providing secure fax, data, telex, and voice.

Fig. 4-6. SATCOM
Commercial Supplements

JOINT TACTICAL GROUND STATION (JTAGS)

JTAGS is the transportable in-theater element (**Fig. 4-7**) of the U.S. Space Command's Theater Event System and provides Theater Commander's a continuous 24-hour capability to receive and process in-theater, direct down-linked data from space-based sensors. JTAGS ties directly to worldwide and theater communications system to immediately disseminate critical information. JTAGS supports all Theater Missile Defense pillars and provides worldwide warning and alerting as well as in-theater voice warning and cueing information on tactical ballistic missiles and other tactical events of interest.

The JTAGS processes data from up to three DSP satellites to determine launch points and time, azimuth of flight, predicted ground impact point and time for TBMs. JTAGS supports passive defense by providing in-theater early warning of enemy ballistic missile launch events, and provides alert notification to command level staffs, who disseminate the alert message to units in the threatened area. JTAGS also supports active defense by cueing air defense assets to the missile track. Data is also provided on launch location to deep attack assets to aid in attack operation.

The key in JTAGS theater support is its relatively direct connectivity and distribution architecture, via a variety of voice and dam networks. By its in-theater location, JTAGS provides timely, assured early warning. ARSPACE operates two JTAGS sections indefinitely forward deployed by CINCSPACE to Korea and Germany, and maintains deployable sections in CONUS for contingencies, training and exercise support.

Fig. 4-7. JTAGS

1ST SATELLITE CONTROL BATTALION

The Defense Satellite Communications System (DSCS) provides reliable, robust, worldwide, continuous communications support to US warfighting forces, strategic military users, the US intelligence community and the National Command Authority. Customers can communicate via the DSCS using large, fixed earth terminal ground stations, transportable ground stations, and highly mobile, tactical ground stations.

The 1st SATCON Battalion is responsible for the daily C2 of the DSCS satellite and communications networks supported by these satellites (**Fig. 4-8**). The battalion operates the DSCS Operations Centers (OC), at five SATCOM locations around the world to oversee all use of the DSCS, ensuring that users receive the optimal SATCOM support authorized.

On a typical day, the DSCS OCs control nearly 1,000 links providing vital communications support to deployed warfighters, strategic users, and the intelligence community around the world.

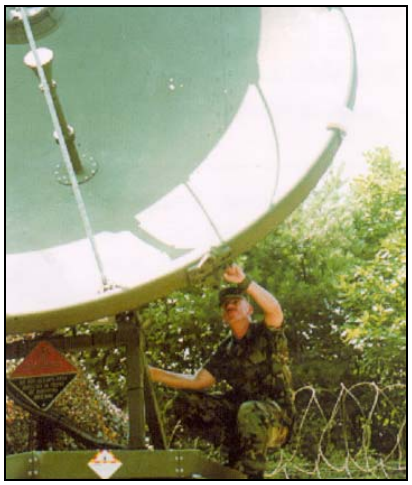

Fig. 4-8. DSCS Comms

REGIONAL SATCOM SUPPORT CENTERS (RSSC)

RSSCs provide the joint warfighter with a single focal point for select satellite communications use within a region. RSSCs coordinate and ensure that ground mobile forces obtain necessary access to DSCS SHF-band, MILSTAR EHF, and limited commercial satellite resources. Additionally, they provide tactical communications satellite network planning and management support for CINCs and DOD agencies. The RSSCs are located at Wheeler Army Air Field, Hawaii; Patch Barracks, Germany; Arlington, Virginia; and Tampa, Florida for focused support to CINCs. In the future, the RSSCs will be one-stop-shops for all CINC and DOD SATCOM requirements-EHF, SHF, UHF, GBS and commercial.

SPACE AND MISSILE DEFENSE BATTLE LAB (SMDBL)

Fig. 4-9. SMDBL

The U.S. Army Space and Missile Defense Battle Lab (SMDBL) (**Fig. 4-9**) was activated on October 1, 1997. The SMDBL is the result of the Army's commitment to provide space and missile defense capabilities to the warfighter as rapidly as possible. The SMDBL joins the other Army, Navy, Air Force, and Joint Battle Labs that focus on quick delivery of innovations and future technologies to today's warfighter. It was formed from elements of the former Missile Defense Battle Integration Center and the Army Space Command (Forward).

Core Competencies

- *Concepts and Initiatives.* The Battle Lab identifies and examines candidate concepts, initiatives, and technologies for near-term infusion into Army space and missile defense programs or for experimentation on approved future operational capabilities. To focus military science and technology research, the SMDBL will also coordinate with Missile Defense and Space Technology Center and other materiel development activities. Additionally, this area will provide forward-looking wargaming activities to the command, including participat-

ing in the Army After Next series of long-range Army wargames.

- *Experiments, Exercises, and Training*. The SMDBL coordinates, conducts, and participates in efforts focused on bringing space and missile defense capabilities to the warfighter, including support to joint and service Commander-in-Chief exercises, Advanced Warfighting Experiments, Army Experiments, and unit training activities. Products generated by the Battle Lab through experimentation include insights, impacts, validated requirements, concepts, and leave-behind solutions, as well as changes to doctrine, training, and materiel.
- *Simulation*. Leveraging the growth and maturation of computer-based models and simulations, the Battle Lab is expanding the use of its models and simulations beyond the materiel development and analysis domain to provide sophisticated capabilities to the warfighter. Through innovative techniques, the Battle Lab has developed an interface capability to link existing simulations directly to Army Tactical Command and Control systems, so the warfighter can be directly simulated at the actual workstations in realistic environments.
- *Analysis*. The Battle Lab supports experimentation, conducts analyses in support of materiel development activities and requirements determination, performs science and technology reviews, assesses advanced concepts, and analytically supports the definition of future space and missile defense architectures.

Current Capabilities/Products

- *Synthetic Battlefield Environment*, or SBE, has been developed to provide computer simulation technologies to the warfighter in realistic formats. The SBE consists of computer-based models and simulations, simulation to tactical system interface units, and communications and network technologies, linked in a modular environment. The SBE provides the ability to stimulate Army and joint tactical command and control systems with simulations, allowing the warfighter to train on go-to-war equipment. The SBE is also suited for use by the analysis and materiel development communities, lending an operational validation to off-line simulations. The Battle Lab has successfully used the SBE in various war-fighting experiments, CINC exercises, and training events, including Roving Sands, Ulchi Focus Lens, and Coherent Defense.
- The *Extended Air Defense Testbed*, or EADTB, and *Extended Air Defense Simulation*, or EADSIM, form the core of the SBE computer simulations. The user friendly, flexible EADTB offers a high-fidelity modeling capability to operational commanders and combat and materiel developers. EADSIM, used in Desert Storm operations to plan air and air defense campaigns, is a low-to-medium fidelity comprehensive air and missile defense simulation that has widespread acceptance throughout the DOD, all three services, and most allied countries.
- The *Synthetic Battlefield Center*, or SBC, and *Hardware/Software Integration Center*, or HSIC, are laboratory environments for the Battle Lab to conduct experiments and support exercise and training activities. The SBC and HSIC combine the SBE with operational command and control workstations to allow the Battle Lab to provide interactive stimulation

to the warfighter through tactical workstations and equipment.

ARMY SPACE EXPLOITATION DEMONSTRATION PROGRAM (ASEDP)

The genesis of the ASEDP was an Army Space Council meeting in April 1987. During this meeting the Vice Chief of Staff of the Army, LTG Maxwell Thurmond, gave guidance from which the goal, philosophy, and objectives of the ASEDP are derived: "Enhance Air-land Battle execution by demonstrating how space based assets could support tactical commanders." This quote was historically significant, because it gave the Army Space Agency, and then the US Army Space Command, the command guidance needed to initiate the program which would eventually become the ASEDP. Responsibility for the Army Space Exploitation Demonstration Program (ASEDP) was assigned to the SMDBL Directorate located in Colorado Springs, Colorado.

The SMDBL continues to investigate and demonstrate space-related technologies and support space requirements documentation to maintain the US Army's preeminence on the battlefield through the ASEDP.

ASEDP Goal

Demonstrate to the field commander the latest relevant space technology from the commercial and government research and development communities.

ASEDP Philosophy

- Space-based capabilities are critical to rapid force projection operations and smaller scale contingencies.
- Use of space-based capabilities enables the force to dominate the battlefield.
- Space capabilities significantly increase combat effectiveness.
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ASEDP Objectives

- Educate commanders on the use of space-based assets for Army operations.
- Assist in defining requirements for Army development.
- Demonstrate new technology for possible future development.
- Influence the design and use of future space systems.
- Conduct rapid prototyping in support of contingency operations.
- Assist the integration of mature space enhancements into Army Battle Command Systems

ASEDP FY00

All of SMDBL's ASEDP experiments for FY 00 are planned for integration into the Joint Contingency Force Advanced Warfighting Experiment (JCF AWE). The focus of the JCF AWE is to incorporate new warfighting concepts and information age technologies with the Army's light forces. They will continue to be expected to operate in Military Operations in Urban Terrain (MOUT) and restricted terrain environments. JCF AWE is the light force early entry portion of the Force XXI series of experiments. By utilizing JCF AWE, a cost effective venue became available for the SMDBL to exercise ASEDP experiments. The SMDBL JCF AWE- related initiatives are:

- Force Warning

- Mobile Satellite Service (MSS) and Hand-held Command and Control Wireless Communications
- Enroute Planning and Rehearsal System (EMPRS)
- Tactical Weather
- Precision SIGINT Targeting System (PSTS)
- Eagle Vision II (EVII)

Force Warning. The space-based Force Warning initiative provides a robust force warning and force protection architecture that supports Light and Strike Forces with the dissemination of time-sensitive battlefield intelligence. Force Warning devices (**Fig. 4-10**) receive critical messages such as incoming missile notification, minefield locations, chemical hazards, and guerrilla activity, and provides early entry forces with situational awareness in a handheld device. The space-based Force Warning initiative combines the use of a joint Common Operational Picture (COP) and processed intelligence data to determine battlefield hazards and send rapid notification directly to the affected or threatened forces.

Fig. 4-10. Force Warning Pager

Up to 25 Iridium pagers will be fielded during the JCF AWE. Elements of the 10th Mountain Division, 82nd Airborne Division, Special Operations Forces, and Rangers will be equipped with the Force Warning pager. Additionally, pagers will be located with the Joint Task Force (JTF) Headquarters and with the Air Force, Navy, and Marine Corps. The pagers will provide added value during many phases of the operation. The goal is for the pagers to be employed from the enroute mission planning and rehearsal phase through the heavy follow-on phase, providing forces with time-sensitive situational awareness and battlefield hazard notification.

Mobile Satellite Service (MSS) and Hand-held Command and Control Wireless Communications. (HC2WC)

This demonstration leverages current and emerging commercial Mobile Satellite Service (MSS) technologies to provide the Army commanders the ability to obtain a near-real time Common Operational Picture and to pass this COP to higher headquarters using Beyond Line of Sight (BLOS) communications. The demonstration allows the soldier in the field to pass current positional and situational information to higher headquarters and to receive regional COP from the Division Tactical Operations Center (DTOC). It can use low earth orbit (LEO), medium earth orbit (MEO), or geostationary earth orbit (GEO) satellites to provide the BLOS communications. This demonstration was initiated as part of the Joint Warrior Interoperability Demonstration (JWID) 1999, and demonstrated as the Joint Space-Based Common Operational Picture Enhancement (JSCOPE). The objectives of MSS/HC2WC are:

- Two-way messaging in common military
- Position Reports
- Call for Fire Messages

- Battlefield Situation Messages
- Self-contained device

Enroute Planning and Rehearsal System (EMPRS). The Enroute Mission Planning and Rehearsal System (EMPRS) (**Fig. 4-11**) provides commanders the capability to receive operations and intelligence updates while in flight, conduct collaborative planning with headquarters and forward elements, and disseminate and rehearse mission changes among the combat forces enroute to the objective area.

Fig. 4-11. EMPRS

EMPRS is a collaborative effort with SMDBL, the Dismounted Battlespace Battle Lab, ASEDP, and Team Monmouth to provide the aeronautical satellite communications connectivity for EMPRS. This communications segment exploits the growing commercial market in MSS. Through the use of SMDBL's Advanced Research Center Telecommunications Interface Console (ARCTIC), several satellite channels can be combined to give an overall data throughput sufficient to support collaborative planning functions such as chat, file transfer, whiteboarding, and teleconferencing.

Tactical Weather. For years, Army Commanders have been forced to cope with or avoid the weather. The Tactical Weather capability gives the Army Commander weather products that can change "cope or avoid" to "anticipate and exploit." This is accomplished through mission-focused weather products embedded in common Army Battle Command Systems (ABCS) applications. SMDBL is currently experimenting with two weather systems that will greatly enhance the commander's focus on the battlefield: the Deployable Weather Satellite Workstation (DWSW) and the Meteorological Automated Sensor and Transceiver (MAST). DSWS provides timely and accurate weather data that is critical to the battle plan. As a tactical terminal located in a tactical operations center (TOC), the DWSW will acquire, process, and distribute real-time high, resolution weather imagery and tailored products to users. This capability allows Staff Weather Officers (SWOs) to build a more complete weather database tailored to the commander's needs. DWSW is a commercial "off-the-shelf' system consisting of two 18-inch diameter flat-tracking antenna, a modular geostationary antenna seven feet in diameter, a computer workstation with color monitor, and a software package that provides zoom, imagery animation, and color enhancement. This entire package is transportable in the Army's High Mobility Multipurpose Wheeled Vehicle (HMMWV), or it can be palletized for air transport. DWSW served as the weather satellite receiver DWSW provides timely and accurate weather data during Task Force XXI and Division XXI AWEs. With SMDBL as the initiative proponent, DWSW will again be linked with the Army's Integrated Meteorological System to participate in the JCF AWE.

Utilizing satellite visual, infrared, and microwave sensors, the DWSW system

provides weather data for the battlefield, day or night:

- Cloud imagery with resolution to 0.55 km for overlay on the ABCS.
- Cloud imagery for situational awareness and precipitation for mobility assessment.
- Three-dimensional atmospheric wind, temperature, and moisture fields.
- Surface temperature, soil moisture, snow and ice areas, and land classification.

Fig. 4-13. PSTS Architecture

Fig. 4-12. MAST

MAST (**Fig. 4-12**) integrates surface weather sensors (visibility, wind, temperature, barometric pressure, and humidity) with a LEO satellite transceiver relaying the information instantaneously. The man-portable MAST can be programmed to transmit surface weather observations hourly, or as often as needed, to the Division SWO. The MAST observations can become another digital layer of weather information for the ABCS.

Precision SIGINT Targeting System (PSTS). In a hostile environment, commanders need timely and accurate information about specific enemy targets. The Precision Signal Intelligence (SIGINT) Targeting System (PSTS) (**Fig. 4-13**) exploits an existing sensor-to-shooter architecture, providing information and supporting the timely destruction of time-critical and high payoff targets. The PSTS architecture capitalizes on the capabilities of the Guardrail Common Sensor (GRCS) and National Technical Means (NTM) to provide the warfighter with the location of enemy non-communication emitters (such as the radar used by the SA-6 air defense system depicted). The Army's organic Tactical Exploitation of National Capabilities (TENCAP) systems, together with the tactical SIGINT targeting architecture, support the timely and accurate delivery of priority target coordinates to commanders.

Eagle Vision II (EVII). Eagle Vision 11 (**Fig. 4-14**) is a mobile satellite ground station that receives a direct downlink of unclassified data from commercial imaging satellites. The data is processed and provided to deployed theater and corps tactical and operational commanders in usable digital image formats for command and control, mission planning, intelligence, and geographic information systems. EVII provides timely receipt of

data for military operations and humanitarian assistance missions.

EVI I supports the development of situational awareness by providing the capability to collect, extract, and exploit information about the physical characteristics of the earth's surface, to include natural and man-made features, in order to build a basic foundation for the common knowledge of the battlespace. Terrain data may be generated or enriched by detailed analysis of raw images avail able from this theater asset. Terrain analysts will use the newly acquired data to enrich the digital topographic database with dynamic environment data, higher resolution feature data, and higher resolution elevation data.

Fig. 4-14. EV II

ARMY SPACE PROGRAM OFFICE (ASPO)

The Army Space Program Office, or ASPO, is responsible for the Army's tactical exploitation of national capabilities - TENCAP. The program focuses on exploiting current and future tactical potential of national systems and integrating the capabilities into the Army's tactical decision-making process. Army TENCAP systems enable the tactical commander to see and hear deep in today's battlefield and then assess the impact of shooting deep. The ASPO has successfully fielded more than 60 systems and is continually exploring ways to integrate advanced technologies into its inventory.

Primary ASPO Missions

Support appropriate organizations to develop/implement streamlined concepts of operation and requirements.

Design, develop, test, field, and sustain systems that provide national and theater products to tactical commanders.

Provide the responsible Program Executive Officers with the appropriate technologies and acquisition activities.

Provide technical support to the Army staff with respect to TENCAP activities.

Act as the focal point for technical, fiscal, and operational interactions with the national community to include:

- Identifying technologies to enhance the Army mission
- Coordinating training and exercise support for national systems
- Acting as point of contact for all tactical activities between major commands/users and the national community
- Serving as technical adviser and technical expert to TRADOC and battle labs.

TENCAP Systems

- The *Advanced Electronic Processing and Dissemination System* replaces the Enhanced Tactical User Terminal and Electronic Processing and Dissemination System. The system receives and processes raw data from selected national sensors, stores processed data, and produces intelligence reports, and has the dual function of situation awareness and projection.
- *Mobile Integrated Tactical Terminal, or MITT*, is a division- and corps-

level truck-mounted system capable of providing multiple source intelligence and secondary imagery to the tactical commander. It provides ETUT functionality in a smaller and more mobile configuration which receives, processes, and disseminates multi-disciplined information.

- *Forward Area Support Terminal* was developed to provide a downsized functional equivalent of the MITT, offering the same capabilities in a modular, portable system. This single position unit, weighing 1,200 pounds, is easily transportable.
- The *Tactical Exploitation System*, or TES, is the next generation TENCAP system. It combines total TENCAP functionality in an integrated, downsized, scalable system designed for split-base operations and can receive, process, exploit, and disseminate data. As a replacement for the Advanced Electronic Processing and Dissemination System, Modernized Imagery Exploitation System, and Enhanced Tactical Radar Correlator, the TES will be smaller, lighter, and more powerful than current systems. Enhanced Tactical Radar Correlator, or ETRAC, is the latest generation TENCAP system. It provides real-time radar imagery data to the corps commander and has the capability to receive direct downlinks from the U-2. The ETRAC is a highly mobile system that can drive on and off a C-130 aircraft, making it easy to provide direct support to early entry operations. The ETRAC is an enhanced version of the TRAC van used in Desert Storm to downlink U-2 imagery.
- *Modernized Imagery Exploitation System*, or MIES, was developed to support imagery operational areas, intelligence development for indication and warning, situation assessment, order of battle, targeting, and tactical operations. The MIES is a modernized version of the system deployed to Saudi Arabia to provide imagery support to CENTCOM during Desert Storm. MIES provides for the receipt, processing, exploitation, storage, and dissemination of imagery intelligence from national and selected theater collectors. Planned upgrades include interfaces to planned national capabilities and migration to Common Imagery Ground/Surface System standards.

CONCLUSIONS

The Army's dedication to maintaining a tactically relevant presence in the space community was demonstrated by General Gordon R. Sullivan (Retired), then Chief of Staff of the Army, when he stated:

"Aggressive exploitation of space capabilities and products normalized in concepts, doctrine, training, operations, and modernization will ensure that the Army is able to maintain land force domination well into the 21st century. The Army's future is inextricably tied to space."

Success on the future battlefield requires exploitation of the Army's five doctrinal tenets:

- *initiative,*
- *agility,*
- *depth,*
- *synchronization,*
- *and versatility.*

The extension of that battlefield into space provides commanders with an enhanced capability to exploit and advance these tenets across all Army operations. Combining near-continuous, global coverage, real-time and near-real-time capabilities for communications, positioning/

navigation, surveillance, environmental monitoring, warning and target acquisition allows commanders to anticipate enemy actions; strike at vulnerable points faster than the enemy can react; and win the land battle. Likewise, these same capabilities allow the commanders to have success in operations other than war.

As the Army moves into the 21st century, it's imperative that it remains involved in space and fully exploit space capabilities. The Army will continue to define its role, identify requirements and plan strategies for involvement. It will also participate more in the joint, combined, civil and commercial enviroments to optimize its use of this fourth medium of warfare.

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