AIR DEFENSE ARTILLERY

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SPACE!

Space Operations Intertwine With Air and Missile Defense Operations

Ground-Based Interceptor Silo Construction at Fort Greely, Alaska
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ADA MAGAZINE

A PUBLICATION OF THE ADA ASSOCIATION

OCTOBER - DECEMBER • 2005

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On the Cover A booster rocket carrying the Ground-Based Missile Defense system's exoatmospheric kill vehicle soars aloft from Kwajalein Atoll during a January 2004 test. Inset photos show missile silo construction and the insertion of the first ground-based interceptor missile at the Missile Defense Complex, Fort Greely, Alaska.

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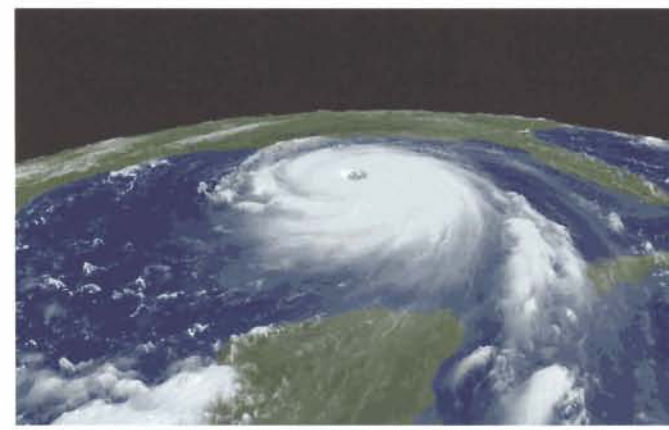
INTERCEPT POINT

by BG Robert P. Lennox

As hurricanes approached the Gulf Coast in August and September 2005, commercial imagery from the same satellites that support our Soldiers deployed in harm's way revealed the storms' awesome power, triggering life-saving evacuations all along the Gulf Coast. In the wake of Hurricane Katrina and Rita, commercial satellite imagery is helping guide rescue and recovery operations.

Today on the airplane I read an ad for satellite communications—the one sure way to communicate in a crisis. Imagine that! The recent hurricanes provided just one example of the ways in which space operations touch the lives of all Americans, including American Soldiers who wear ADA insignia.



This satellite image shows Hurricane Katrina's ominous approach.

Space operations are intricately entwined with air and missile defense operations. ADA Soldiers assigned to U.S. Army Space and Missile Defense Command (SMDC) organizations operate ground-based midcourse defense (GMD) interceptors, which are poised to protect the homeland of the continental United States against ballistic missile attacks. They also operate Joint Tactical Ground Stations (JTAGS), which provide in-theater tactical ballistic missile warning, alerting and cueing data to air and missile defense fire units. And many ADA officers continue to wear ADA insignia, but have made the switch from Functional Area (FA) 14, Air Defense Artillery, to FA 40, Space Operations. (A functional area, which is not to be confused with a branch, such as Air Defense Artillery or Field Artillery, is a grouping of officers by technical specialty or skill.)

Our ability to protect the force from air and missile attack depends on our ability to continue leveraging space technology and assets to enhance the effectiveness of our existing and future air and missile defense systems. Therefore, the destinies of air and missile defense operations and space operations are indivisible. Accordingly, this issue of Air Defense Artillery magazine is devoted to space operations. ADA Soldiers who depend on space forces for target data deeply appreciate the importance of space operations, but to many, space organizational structures and system architectures—which I grew familiar with as SMDC's deputy commanding general prior to my present assignment—are probably something of a mystery.

Space Operations Overview

The U.S. Army SMDC/U.S. Army Forces Strategic Command (ARSTRAT) is dedicated to bringing products, services and capabilities from space to mud. The field of space operations encompasses a wide variety of disciplines, agencies and arenas. From satellite imagery that can be used by the warfighter to plan and execute the fight, to satellite communications spanning the globe and seamlessly allowing all levels of the Department of Defense (DoD) to communicate, to sending Army astronauts to the International Space Station, space operations touches every Soldier, Sailor, Airman and Marine in some way. The command is composed of two brigades and a detachment, as well as the Future Warfare Center (FWC), the U.S. Army Training and Doctrine Command (TRADOC) System Manager (TSM), and the Joint Functional Component Command (JFCC) for Integrated Missile Defense (IMD).

The "oldest" brigade is the 1st Space Brigade, composed of the 1st Satellite Control (SATCON) Battalion, the 1st Space Battalion and the 193rd Space Battalion of the Colorado Army National Guard (ARNG).

The 1st SATCON Battalion became a part of the former U.S. Army Space Command in October 1990, after more than 20 years of direct responsibility to the DoD as a primary satellite communications activity. In November 1995, the 1st SATCON Battalion was activated as the Army's first ever battalion dedicated to providing quality space support to all of DoD. The battalion has six companies forward deployed around the world. The company sites are at Fort Detrick, Md., Fort Meade, Md., Camp Roberts, Calif., Landstuhl, Germany, Camp Buckner, Okinawa and Colorado Springs, Colo.

The Defense Satellite Communications System provides outstanding wideband coverage for warfighters around the globe. Simply put, the soldiers of the 1st SATCON Battalion control the payloads on the satellite, telling it where to look for signals and messages. Its combination of "steer-able," configurable antennae and robust constellation provides access to the Global Information Grid regardless of *—Continued on Page 31*

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STRIPES

by CSM Stanley L. Davis

On 15 September 2005, President George W. Bush forwarded the Base Realignment and Closure Commission report to Congress, concurring with the recommendation to move the Air Defense Artillery School from Fort Bliss, Texas, to Fort Sill, Oklahoma, and collocate it with the Field Artillery School to create a Net Fires Center. Nonetheless, it remains certain ADA will continue to perform an indispensable role in our national defense as one of our Army's most vital combat arms branch. As details of the move are ironed out, air defenders can look forward to an increased diversity of assignment and enhanced promotional opportunities. Here is a brief snapshot of a few of these existing and evolving opportunities.

Two of our most rewarding assignment opportunities for Military Occupational Specialty (MOS) 14J, Air Defense Command, Control, Communications, Computers and Intelligence Tactical Operations Center Enhanced Operator/Maintainer, Soldiers are featured in this issue of the Air Defense Artillery magazine with articles about Soldiers who operate technically sophisticated Joint Tactical Ground Stations and Ground-based Midcourse Defense (GMD) systems in places like Osan, Korea and Fort Greely, Alaska. Other assignment opportunities for MOS 14J Soldiers include Air Defense Airspace Management (ADAM) cells, which are being fielded at every echelon of the Modular Force, creating a tremendous demand for MOS 14J Soldiers and making it the "hottest" MOS in our branch. In response, many of our MOS 14R, Bradley Linebacker Crewmember, Soldiers have seized this excellent opportunity and applied for reclassification to MOS 14J. Still, we have an ongoing shortage of staff sergeants in MOS 14J and the Army has designated it a "Star" MOS at the staff sergeant level. This means all eligible sergeants who make the standing list for promotion are virtually guaranteed promotion to staff sergeant until we fill these critical vacancies.

Another exciting development which promises to increase MOS 14J and MOS 14S, Air and Missile Defense (AMD) Crewmember, assignment opportunities is a recently tested counter-rocket, artillery and mortar (C-RAM) system that utilizes the Navy's Phalanx weapon system. In September 2005, the Air Defense Artillery School submitted a force design update through U.S. Army Training and Doctrine Command recommending the creation of new C-RAM batteries and battalions. We are eagerly awaiting an affirmative decision, which would increase our total force structure and provide challenging new assignments for our Soldiers; plus, give interested MOS 14R, Bradley Linebacker Crewmember, Soldiers an excellent opportunity to reclassify and remain in the branch.

In November 2005, we will start accessing females for MOS 14S, as Air Defense Artillery continues to lead the way in career opportunities for women serving in combat arms. Together with their current male counterparts, they will begin to transition our Avenger force to the new Surface-Launched Advanced Air-to-Air Missile (SLAMRAAM) system to counter the emerging threat of cruise missiles.

Meanwhile, we are continuing to transform our Patriot force from 50 to 52 batteries to field eight Patriot pure battalions and five composite air and missile defense battalions, each composed of four Patriot and one Avenger battery. Plus, we are developing a combined aggregate program to incrementally transition our Patriot systems to the new Medium Extended Air Defense System (MEADS) of the future. In conjunction with these initiatives, we are planning for the branch's future fielding of the Terminal High-Altitude Area Defense (THAAD) missile system and the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) aerostat-based sensor, which will also provide improved defense against cruise missiles. The fielding of these weapon systems will create additional assignment opportunities working with cutting edge technology for our MOS 14E, Patriot Fire Control Enhanced Operator/Maintainer, and MOS 14T, Patriot Launching Station Enhanced Operator/Maintainer, Soldiers.

As a final note, now is the time for ADA Soldiers desiring to become warrant officers to apply for Warrant Officer Candidate School. By fiscal year 2010, our branch will need 263 MOS 140E, AMD Systems Tactician/Technician, and 166 MOS 140A, Command and Control System Technician, warrant officers to man our ADA force. Just like NCOs, we have to grow our own, and we must fill these warrant officers positions from our ADA NCO corps.

In closing, organizational structures for future weapon systems are still being determined; however, the branch seems certain to grow as the Army continues to evolve into a modular and tailorable force. As our nation's reliance on Air Defense Artillery to counter the growing air and missile threat is increasing, we are transforming to meet the threat array of the future. In the end, our branch will emerge from Army transformation as a stronger, more versatile and effective fighting force filled with challenging assignments and robust promotional opportunities for all ADA Soldiers.

First to Fire!

Stanley L. Davis

Stanley L. Davis
CSM, USA

SGT Antonio Anderson checks with the shift officer in charge, MAJ Ralph Henning, in the newly modernized and refurbished Space and Missile Defense Command/Army Strategic Command Operations Center.

SPACE: THE EVOLVING IMPORTANCE OF THE FINAL FRONTIER

by LTG Larry J. Dodgen

The U.S. military's transformation to the post-Cold War era was convincingly demonstrated during Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF). The initial phases of both operations, targeted at determined and capable enemy forces, were characterized by well-synchronized ground and air combat enabled by space-based capabilities. The repressive regimes of the Taliban and Saddam Hussein were toppled with unparalleled speed and overwhelming military power.

LTG Larry J. Dodgen

OEF and OIF validated the great potential of advanced technology in the hands of trained professionals. Modern technology and joint operational concepts now routinely provide joint warfighters with capabilities considered extraordinary just a few years ago. Foremost among these capabilities are those that harness space technology and systems. Space-based systems enhance or enable a wide range of capabilities, including expeditious delivery of information, enhanced situational awareness, higher operational tempo, greater lethality, increased survivability and reduced planning times.

Analysis of the lessons from the initial phases of OEF and OIF is ongoing; however, three key points are resoundingly clear:

- The value of space systems has been proven repeatedly in Afghanistan and Iraq
- Space must be part of military operational planning at the earliest opportunity
- Space-based capabilities must focus on support to the warfighter ("Space to Mud")

Supporting the Current Fight: Keeping it Relevant

The 21st century is showing itself to be an era of uncertainty and unpredictability. Our nation's strategic environment is different than the past. Threats from adversaries and the missions our military are increasingly called on to perform are fundamentally changing. Ongoing combat operations in Afghanistan and Iraq also show that lightning assaults, space-based technologies and precision-strike capabilities alone are insufficient to defeat the current enemy. Compounding the challenge for our military forces are insurgent forces who attempt to blend into the local population, making it easier for them to elude advanced surveillance technology and precision strikes. As a result, the capabilities and the manner in which they were employed with such resounding success against the Taliban and Baathist regimes will need to evolve to defeat

In August 2004, the U.S. Army Space and Missile Defense Command activated the Army's first unit of employment space support element (SSE). The element chief was LTC George Andary, left. He was supported by MAJ Cliff Hodges, MAJ Jim Rozzi and (not shown) SSG Ronnie Anglin. The SSE supported the 3rd Infantry Division during its deployment in Iraq as the Multinational Division-Baghdad.

the asymmetric threats of the future.

Insurgent forces in Afghanistan and Iraq, waging asymmetric warfare, possess and employ a wide variety of irregular means in attempts to avoid our strengths and exploit our vulnerabilities. They have planted and detonated prolific numbers of technologically crude but deadly improvised explosive devices (IEDs). These IEDs have been extraordinarily varied in design and imaginative in their employment. In addition to coalition forces, the targets of these attacks have even been international institutions, noncombatants, individuals affiliated with nongovernmental charitable organizations and commercial companies involved in reconstruction. Shoulder-fired rocket-propelled grenades, explosive-laden vehicles, suicide bombers and insurgents fighting tenaciously house-to-house have added additional risk and complexity for the coalition forces.

In an insurgent environment, one might believe that space is irrelevant. Nothing could be further from the truth. The relevance of space is important and its significance continues to grow. However, focus, the ability to adapt and innovation are required to ensure space-based systems and products remain relevant to the current fight. The goal of providing relevant support to our warfighters is to furnish them with capabilities necessary to keep pressure on enemy forces. Achievement of this goal will require our emphasis in four areas:

- ***Support must be responsive and assured to the warfighter on the ground.***

Warfighters need immediate access to actionable information. However, as observed by GEN James E. Cartwright, commander, U.S. Strategic Command, "Thanks to satellites, the military can gather information more quickly than high-level leaders can react to it." The result is that our ability to collect information has eclipsed our ability to process it into actionable information.

Warfighters often encounter data-overload, making it a challenge for them to identify what they need to know. In this regard, two points are relevant: shared information does not automatically, if ever, lead to shared understanding, and higher quality information does not necessarily increase performance. An example was cited by an intelligence officer in an after action report from OIF: "Intelligence sections at all levels were inundated with information and data that had little bearing on their mission or intelligence requirements. Information was not disseminated based on a proactive evaluation of what supported commanders needed; it was just disseminated."

There are many variables in determining what information is valuable to commanders and planners. As a result, intelligence and space professionals working with supporting agencies must strive to understand how warfighters will use selected information in different scenarios, and then proactively seek to support those information requirements. It is also important that relevant operational requirements for warfighters remain the primary focus of attention rather than the implementing architecture and its processes.

- ***Support must be timely.***

Support must be provided "in time" to be relevant to warfighters; support that arrives late serves as nothing but a historical side note. For example, in preparation for possible combat operations prior to OIF, "timely" support was provided by the Space and Missile Defense Battle Lab (subsequently reorganized as part of the new Space and Missile Command [SMDC]/Army Strategic Command [ARSTRAT] Future Warfare Center) in fielding applied technology in the form of the Space Support Element Toolset - Light for use by the Army space support teams (ARSSTs). This capability enabled the rapid delivery of large data files to the ARSSTs without directly competing for the supported units' limited wideband communications assets.

Tremendous efforts are being expended to expedite delivery of the most relevant equipment to our warfighters. The Army Posture Statement notes, "Many technologies are already being fielded to our frontline Soldiers to dramatically improve their capabilities. Specific science and technology initiatives will improve existing capabilities to detect and neutralize mines and improvised explosive devices; identify friendly forces in combat; identify hostile fire indicators; and enhance survivability, training systems and robotics."

Technologies and capabilities being developed in support of the future force are being leveraged to support current force requirements. For example, in July 2004, the Army restructured the Future Combat Systems Program to accelerate delivery of crucial new capabilities to the current force. By accelerating the Future Combat Sys-

tem Program, promising technologies are being "spiraled" sooner than initially planned in support of Soldiers. Technological solutions like the Warlock, designed to interfere with IEDs detonated via electronic transmissions, are being initiated in direct response to warfighter requirements. The Army is aggressively implementing other similar initiatives in an effort to expedite technological solutions in support of our deployed warfighters:

- The Rapid Fielding Initiative is designed to fill Soldier equipment shortfalls by quickly fielding commercial off-the-shelf technology rather than waiting for standard acquisition programs to address these shortages.
- The Rapid Equipping Force program typically uses commercial and field-engineered solutions to meet immediate operational needs. Rapid Equipping Force solutions are then assessed for wider fielding and incorporation into standard acquisition processes.

▸ ***Support must be flexible.***

Rapidly evolving combat situations demand responsive and tailorable solutions. Although quality well-trained Soldiers able to adapt to the constantly changing demands of the battlefield will always be our most valuable assets, optimum results are generally not gained by depending on our Soldiers' "work-arounds" and "on-the-fly" solutions. The key is to use existing systems in new ways, by applying new ideas and by increasing the dialogue between warfighters and material developers.

Ongoing combat operations, coupled with today's highly fluid environment, require systems and capabilities that can satisfy warfighters' requirements in multiple operational scenarios. This imperative will keep increasing with the requirement of the future force as part of the joint force, according to Joint Vision 2010, "operating unilaterally or in combination with multinational and interagency partners, to defeat any adversary and control any situation across the full range of military operations."

The provision of support within a joint context is an operational imperative. As noted by Vice Admiral Lowell Jacoby, director, Defense Intelligence Agency, "Today, it really does not matter whether targeting data is provided by a space-based system, a manned or unmanned airborne vehicle or a forward observer working with a U.S. Army or Marine Corps infantry company or small platoons of Afghan national army troops."

An area where we are helping to instill greater flexibility in our support to joint warfighters is the establishment of an organic space support element (SSE) in each of the Army's reorganizing "modular" divisions, the unit of employment (UEx). Even now, the first SSE, deployed with the 3rd Infantry Division in Iraq, serves as the focal point for maximizing space-related capabilities in support of tactical warfighting requirements in concert with the Joint and Interagency and Multinational partners. SMDC/ARSTRAT's involvement in integrating the various Joint Blue Force Situational Awareness (JBFSA) systems in the development of a common operating picture will be instrumental in transitioning from stand-alone, "stovepipe" systems to new concepts of operations that embrace joint force operations and integrated capabilities. This initiative will enhance the flexibility available to warfighters.

▸ ***Support must be deliverable to warfighters on the move in an asymmetric environment.***

Our future adversaries and concepts of operation to fight them are not like those of the past. More than ever before, joint warfighters will depend on support that lets them pursue the enemy on a 24/7 basis. In the words of President George W. Bush, "When terrorists spend their days struggling to avoid death or capture, they are less capable of arming and training to commit new attacks."

In conventional military operations, enemy forces are generally easier to find than to destroy. Relatively large military formations and their equipment usually operate in terrain conducive to maneuver. They also emit a variety of electro-magnetic signatures subject to interception and have physical attributes that make them visible to detection. Warfighters can then bring together a measured amount of military capability to neutralize or destroy the adversary's combat power. In contrast, insurgents operating as individuals or in small groups in "complex terrain" are often masked in the larger population. They conduct activities by using couriers or move as individuals to avoid ready detection. Identifying and targeting these small

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groups or individual insurgents, barely distinguishable from the civilians, is a distinct challenge.

The new security environment will likely include adversaries who have access to advanced technology, including global communications, space-based spectral imagery and automation infrastructures. Adversaries may also attempt to get and use weapons of mass destruction. In fact, President Bush has indicated our nation's greatest threat "is the possibility of secret and sudden attack with chemical, biological, radiological or nuclear weapons."

Confronting these evolving challenges will require us to leverage space-based systems in areas related to persistent surveillance; satellite communications; JBFSA; intelligence, surveillance and reconnaissance; position, navigation and timing; spectral imagery; missile warning; and space control.

"...we want the ability to see everything and know everything..."

As recently noted by Under Secretary of the Air Force Peter B. Teets, "Our goal is transparency—we want the ability to see everything and know everything, while simultaneously denying our adversaries both the ability to do the same, and the knowledge that such capabilities are being used against them. We want to be always one step, or more, ahead of our adversaries—to be first to see, first to understand and first to act."

Transformation Realities

What future warfare looks like has been transformed by the nation's and Army's experiences in Afghanistan, Iraq and the ongoing Global War on Terrorism. However, space-based capabilities will remain essential to future force military operations, and space operations, in support of the future force, will remain focused on five essential tasks:

- Increased deployability and reduced theater footprint
- Enabling situational understanding en route as well as off the ramp during entry operations
- Support of precision maneuver, fires, sustainment and information on a non-linear battlefield
- Enabling continuous information and decision superiority
- Protecting the force during all phases of the operation

The process of Army transformation is being subjected to additional realities, including those related to the support of extended combat operations in Afghanistan and Iraq. The challenges for space professionals are in three areas:

- An era of procurement has moved to one of sustainment and replacement. Repair and replacement of equipment subject to heavy use; e.g., Humvees, helicopters and tanks, has prompted action on behalf of the Department of Defense and Department of the Army to reprioritize plans for current and out-year funding. This trend will likely continue for some time.
- Proliferation of systems is not supportable. Tremendous efforts are being expended to ensure the Defense Department acquisition and procurement process takes into account the necessity to integrate capabilities in support of joint rather than service-specific requirements. Similarly, future efforts should reduce the adverse impact of multiple "stove-piped" systems, as was the case for the various blue force tracking systems during the initial phases of OIF. Reportedly, more than 20 disparate systems were used in support of the coalition forces.
- Integration timing issues will continue. The Army's future force, fighting as part of the joint force, will be integrated into an overarching information system, featuring a shared comprehensive picture of the battlefield and offering global access to users at all levels. In some cases, because of development timing and funding, system integration will take place after the systems are fielded.

Evolution of the Final Frontier - Parting Thoughts

Recently, GEN Peter J. Schoomaker, chief of staff of the Army, noted the extraordinary capabilities provided by the Stryker brigade in Iraq when it "disengaged from combat in the Mosul area, moved 420 miles, fought a battle in Bacava along the way and then entered a battle in Najaf. They did all that in a 48-hour period. That performance showed tremendous operational agility and a brigade that is mobile, survivable and very state-of-the-art in terms of communications and command and control." This significant feat was enabled through synchronization of multiple capabilities, many of which were facilitated or enhanced by space-based products and services. Clearly, "the U.S. military cannot undertake any major operation, anywhere in the world, without relying on systems in space," as was written in February 2001 by the U.S. Commission on National Security/21st Century.

The next several years will be challenging and exciting ones for space professionals.

The next several years will be challenging and exciting ones for space professionals. Operationally, space is—and will remain—an essential capability that will continue supporting our joint warfighters. Technically, systems with immense potential are being developed and are on the horizon for fielding. Professionally, tremendous opportunities exist for those who are able to leverage and evolve with the "Final Frontier" in support of our nation and joint warfighters.

LTG Larry J. Dodgen is the commander, U.S. Army Space and Missile Defense Command, Colorado Springs, Colorado.

100th MISSILE DEFENSE BRIGADE

Homeland Security for the Future

by COL Gary Baumann, Commander

The purpose of the Department of Defense's Ground-Based Midcourse Defense (GMD) program is to develop and deploy an efficient, effective system that detects, tracks and destroys incoming long-range ballistic missiles targeted at the American homeland. Today, Army National Guardsmen of the 100th Missile Defense Brigade, stand ready to launch GMD interceptor missiles to defend the United States against limited intercontinental ballistic missile (ICBM) attack, a mission originally scheduled for assumption much deeper into the 21st century.

A question frequently asked is, "Why the Guard? The short answer is that American tradition and military legacy make the Army National Guard the logical choice for the GMD mission.

SSG David Clary, intelligence, analyst, 100th Missile Defense Brigade (Ground-Based Midcourse Defense,) uses a giant missile defense system poster to explain the unit's mission to his young son Devin.

Although Guard units are frequently deployed for combat overseas—as they are today for Operations Iraqi Freedom and Enduring Freedom—the Guard's primary mission has always been homeland defense. During the Cold War, Army National Guard air defenders manned Nike, Nike Ajax and Nike Hercules surface-to-air missile batteries positioned throughout the United States to defend the country against Soviet long-range bombers. As the ICBM threat superseded the long-range bomber threat, Army National Guardsmen briefly deployed the Safeguard system, the nation's first anti-ballistic missile defense system, to defend Minuteman missile silos near Grand Forks, North Dakota. However, Anti-Ballistic Missile Treaty limitations killed the Safeguard system, which was designed to launch higher-altitude Spartan and lower-altitude Sprint missiles tipped with nuclear warheads against incoming ICBMs . The Safeguard complex was deactivated in 1976 after being operational for less than four months. So, in assuming the GMD mission, Army National Guard air defenders are simply assuming a mission that treaty restrictions forced them to abandon nearly three decades ago.

A little more than two and a half years ago, the GMD program was nothing more than a Missile Defense Agency concept, a testbed with no interceptors and no unit organizations. As the fall of 2002 approached, the primary stakeholders were on task to execute the testbed, as well as research and development missions. Seeded with 86 Army National Guard Soldiers to provide warfighter involvement, the testbed was expected to evolve gradually along indefinite timelines into a "potentially deployable" component of a global missile defense system.

In December 2002, President George W. Bush directed the Department of Defense to deploy a capability to defend the nation against long-range ballistic missile attack by the end of 2004. This decision set about a series of events that greatly changed our previous guidance about major weapons system acquisition. The presidential directive put the GMD program on a developmental, testing and acquisition fast track. What had been envisioned as a small-scale development program suddenly became a strategic imperative, rivaling the Manhattan Project, the World War II program that developed the atomic bomb, in scope and urgency, if not in secrecy.

System Development Paradigms

In normal systems development, the user community and the development community jointly develop the required capability through a structured and deliberate approach that ensures the capability is delivered and the gaining users have the doctrinal underpinning and training to employ the capability. In this case, with the rapid accel-

eration of the normal acquisition and fielding timelines, many activities were concurrently executed.

First, the organizational constructs had to be designed and approved. The Force Development and Integration Center, U.S. Army Space and Missile Defense Command (SMDC); U.S. Army Air Defense Artillery Center, Fort Bliss, Texas; and the U.S. Army Training and Doctrine Command (TRADOC) completed what normally would have been a multi-year process in less than six months. Once the structures of the brigade's initial and end-state organizations were determined, Human Resources Command, the Army National Guard and the adjutants general of Alaska and Colorado began expeditiously recruiting Soldiers. Complicating the selection process was the fact that the nation was in the initial throes of war with Iraq, and all components of the Army were designated to support the main effort. Nevertheless, within a year the 100th Missile Defense Brigade had rapidly evolved from an administrative-type organization into a warfighting brigade.

The brigade is comprised of active duty Soldiers as well as active Guardsmen and Reservists. The brigade's one battalion, the 49th Missile Defense Battalion (GMD), consists entirely of active Guard and Reserve Soldiers. Soldiers were selected for inclusion into the units using standards similar to those associated with the Personnel Reliability Program, which provides for screening, selecting and evaluating Defense Department civilian employees who are assigned to positions associated with nuclear resources. This further challenged the personnel management system. In the end, the unit met the manning standard by selecting its organic members and, for short periods of time, mobilizing Army National Guardsmen to flesh out the structure.

Training was also a challenge. During normal systems development, the gaining proponent school has time to develop the required program to effectively train and evaluate the unit. However, little approved training documentation existed at the time the 100th Missile Defense Brigade needed to be trained and certified. The Missile Defense Agency's Joint Program Office and SMDC's Force Development and Integration Center met the challenge by creating a four-tiered training and evaluation program that won TRADOC approval and U.S. Strategic Command acceptance.

The required performance level for individual Soldiers, respective crews and squads assigned to the 100th Missile Defense Brigade is as elevated as the brigade's quality standard for Soldier selection. Within the Training and Doctrine Command process, 70 percent proficiency is generally considered a relative measure of success. The GMD system requires a minimum successful achievement rate of 90 percent. The structure and training regimen are based on the near-zero-defect principle for mission accomplishment, understandable when the mission is to defend the nation against catastrophic attacks. Failure is not an option!

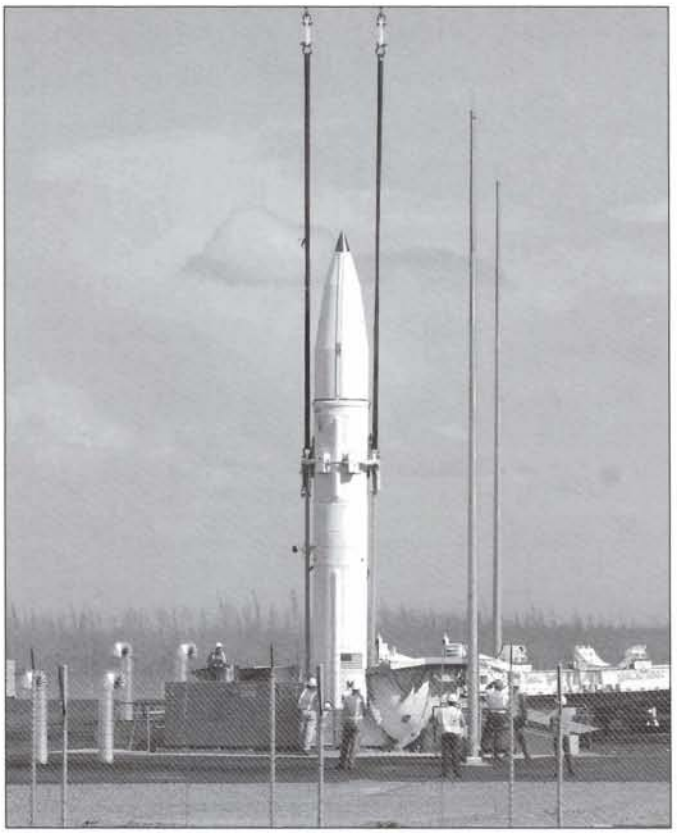
Another unique fact is that the training not only includes the missile defense system personnel, but also those

COL Gary Baumann, commander of the 100th Missile Defense Brigade, accepts the brigade's flag from LTG Joseph M. Cosumano Jr., then commanding general, U.S. Army Space and Missile Defense Command, at a 2004 ceremonial standing up of the nation's first Ground-Based Missile Defense (GMD) unit. Framing the two are, left to right, CSM Daniel Marques, the brigade's command sergeant major, and Air Force MG Mason C. Whitney, adjutant general of the Colorado National Guard.

who protect the system and its users. The Missile Defense Complex under construction at Fort Greely, Alaska, required extremely high standards of security and defense normally associated with strategic assets. However, there was a shortage of available military police due to the conflicts in Iraq and Afghanistan. The Army National Guard and the staff of the Alaska Adjutant General successfully accomplished the massive task of recruiting and training additional Soldiers as military police. Today, military police stationed at Fort Greely and assigned to the 49th Missile Defense Battalion (GMD) provide the required high-level security for the Missile Defense Complex.

GMD System

As the Army met its task of recruiting and training GMD Soldiers, the GMD Joint Program Office set about providing the required GMD capability in what is arguably one of the harshest environments anywhere on earth. Alaska's short construction season, extreme temperature range (60 below zero to more than 100 degrees Fahrenheit) and winds approaching 70 miles per hour challenged the Joint Program Office and Boeing, the primary contractor. Thanks to creative systems development, the required capability, including sensors, fire control, interceptors, silos, and an integrated communications network spanning the globe, was in place by 30 September 2004. Simultaneous with the technical components coming together was the realization that the Fort Greely base infrastructure needed serious attention. Although the



The first ground-based interceptor is lowered into its silo at the missile defense complex at Fort Greely, Alaska, 22 July 2004.

remoteness of Fort Greely was desirable for the GMD mission, it poses significant challenges for the Soldiers who would inhabit it.

Quality of Life

Prior to the decision to deploy a GMD system, Fort Greely had been scheduled for closure. Reestablishing quality of life programs for the Soldiers and their families was of paramount concern. The Fort Greely Garrison Command, Installation Management Agency, GMD Joint Program Office and SMDC formed a team to concurrently upgrade existing facilities and program future improvements. Simple activities like going to a movie or a fast-food restaurant carried new meaning at Fort Greely. The closest fast-food restaurant is more than 88 miles away and driving to the nearest movie theater entails a 196-mile round trip. The nearest post exchange is at Eielson Air Force Base, a distance of 89 miles.

In just two years, more than 100 family quarters have been upgraded. Single Soldier billets have been renovated to the current Army standard that affords each room a private bath. A service station/shoppette, post exchange and commissary are now available to support tenants. A substantial morale, welfare and recreation program now operates a gym with an indoor swimming pool, a skeet and archery range, an auto craft shop, a wood shop and an outdoor recreation shop catering to both summer and winter activities. The Fort Greely Garrison Command has also negotiated with vendors to provide cable television,

LTG H. Steven Blum, right, chief, National Guard Bureau, visits with Fort Greely's commissary director, Rick Stillie, during a visit to Fort Greely, Alaska, to check out the quality of living for 49th Missile Defense Battalion Soldiers.

cable modem and digital-subscriber line technology to post residents. In short, with very little time to accomplish an enormous task, the Fort Greely community has been reinvigorated to support its Soldiers and families.

Summary

In a phenomenally short period of time, during which the nation have been engaged outside its borders with the Global War on Terrorism, tremendous strides have been taken to ensure safety within our borders. Through the efforts of numerous government and private agencies, a capability now exists to provide a limited defense against long-range ICBMs. The presidential mandate has been met, and, for the first time since 1976, we have the capability to defend our homeland. The 100th Missile Defense Brigade is ready when called upon.

COL Gary Baumann is the commander of the 100th Missile Defense Brigade, U.S. Army Space and Missile Defense Command.

SCANNING

1-43 ADA Becomes First Composite Air and Missile Defense Battalion Outside Continental United States

On 15 September 2005, the first composite air and missile defense battalion outside the continental United States came into being. At a reflagging ceremony held at Camp Casey, South Korea, Delta Battery, 5th Battalion, 5th Air Defense Artillery, became Echo Battery, 1st Battalion, 43rd Air Defense Artillery. The reflagging added six Sentinel Radars and 24 Avengers to 1-43 ADA's four Patriot batteries.

Ground-based Missile Defense Soldiers at the Missile Defense Complex in Alaska are treated to stunning views of the Alaska Range during the day and the Northern Lights at night.

DEFENDING THE HOMELAND

49th Missile Defense Battalion (Ground-Based Midcourse Defense)

by LTC Gregory S. Bowen

When President George W. Bush signed National Security Presidential Directive 23 in December of 2002, he directed the Department of Defense to begin fielding a missile defense system in 2004. The conclusion of that document summarizes the commander-in-chief's intent.

> *The new strategic challenges of the 21st century require us to think differently, but they also require us to act. The deployment of effective missile defenses is an essential element of the United States' broader efforts to transform our defense and deterrence policies and capabilities to meet the new threats we face. Defending the American people against these new threats is my highest priority as Commander in Chief, and the highest priority of my Administration.*

To answer the president's call, the 49th Missile Defense Battalion (Ground-based Midcourse Defense), 100th Missile Defense Brigade, was formally activated 22 January 2004 22 at Fort Greely, Alaska. Prior to the activation, numerous activities were underway to man, train and resource the unit.

Mission and Organization

The 49th Missile Defense Battalion (GMD) has three primary missions: operate the GMD system and secure the Missile Defense Complex at Fort Greely, and support test and development activities. To accomplish its missions, the battalion is organized into a headquarters and headquarters battery, consisting of the fire direction center crews, the battalion staff and a military police company. Total authorized strength is 204 Soldiers, consisting primarily of Soldiers with Air Defense Artillery and Military Police military occupational specialties. All members of the battalion are Army National Guard Soldiers on active duty in the Active Guard and Reserve program.

The sixth ground-based interceptor missile is lowered into its underground silo at Fort Greely, Alaska, 11 November 2004.

Missile Defense

There are several critical components of the GMD system located at Fort Greely. The battalion fire direction center is located there, along with all associated communications and computer equipment to support it. Also located at Fort Greely is an In-Flight Interceptor Communications System Data Terminal, which allows updated target information to be transmitted to the interceptor after launch. Last but not least are the interceptors themselves, which are currently emplaced in two missile fields. The complex was designed to accommodate five missile fields with up to 100 interceptors. These components, accompanied by the support infrastructure, are housed within a secure 800-acre complex located south of the Fort Greely cantonment area. From this complex, the entire United States can be defended.

System operation is accomplished through the battalion fire direction center. The fire direction center is one of two fire control nodes in the GMD system, and is focused on the tactical portion of the missile defense fight. Day to day, the fire direction center constantly monitors the world situation and the GMD system readiness. Upon warning, the fire direction center can quickly transition into crisis and combat operations. During this phase, the crew is focused on subsystem performance, system behavior and managing the engagements in accordance with the commander's intent. The GMD fire control system is highly automated; however there is a "human in control" at all times during engagements. The fire direction center crew can manipulate controls within the GMD fire control system to ensure the commander's intent is met.

The fire direction center is manned by five crews consisting of five Soldiers and one subject-matter expert supplied by the contractor. The crews are led by a major and have three officers and two noncommissioned officers. Selected members of the battalion staff are also trained and certified on the system, and can pull crew duty when a primary crew member is on temporary duty status elsewhere or on leave. The fire direction center crews work on a rotating shift schedule, synchronized with the shift rotation used by the Cheyenne Mountain Operations Center and Brigade Missile Defense Element crews.

Before being allowed to stand watch on an operational crew, the Soldiers must complete the GMD training and certification process. This includes a nine-week course in Colorado Springs, Colo., taught by the GMD Joint Program Office as well as positional and crew training conducted by the 100th Missile Defense Brigade (GMD).

Once Soldiers complete this training with a minimum score of 90 percent in all areas, they are eligible to become certified on the system. Table IV certifies each in his or her individual position, and Table VIII certifies the crew. The standards are stringent, and the Soldiers must demonstrate mastery of the system, both in hands-on and written exams.

The first security incident involved a moose, but terrorists pose a greater threat to the Missile Defense Complex.

SGT Javier Arreguin provides cover while SPC Reuben Vargas, both military police officers with the 49th Missile Defense Battalion (Ground-based Midcourse Defense), searches a member of the opposing forces "killed" in a firefight during Exercise Diligent Sentry.

Security

The security mission is comprehensive and is executed by our Military Police company. The MPs are responsible for all aspects of security within the perimeter fence of the complex. They process all personnel and vehicles en-

tering the complex, monitor the alarm and camera systems, patrol the perimeter and the facilities within the complex, and ensure the safety of all personnel working inside the secure area.

The MPs use a variety of vehicles, including up-armored Humvees, all terrain "four-wheelers," small-unit support vehicles and snow machines. For site defense they are armed with pistols, rifles, shotguns, machine guns and MK-19 machine guns.

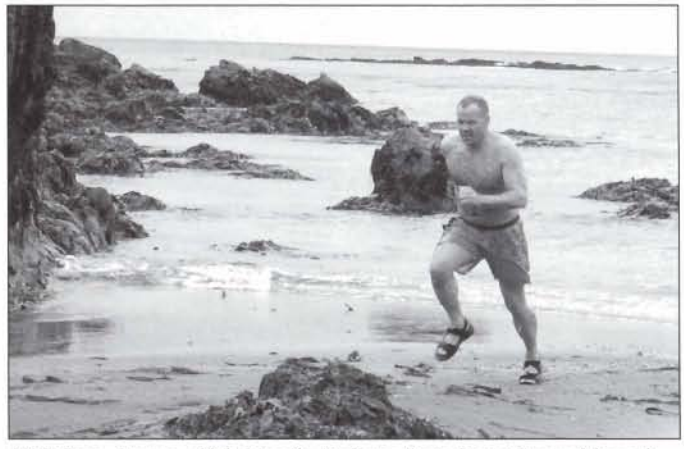
The MPs have been on duty 24/7 since the first piece of sensitive mission equipment was installed at Fort Greely in September 2003. The first security incident on the complex occurred shortly thereafter, when the uniformed security providers observed a grizzly bear chasing a wounded moose less than 50 yards from the guard post. Now that the perimeter fence is complete, animals are no longer an issue inside the complex, but the security cameras often pick up the other inhabitants of Fort Greely wandering in the woods near the site.

Soldiers from 2nd Platoon, A Company, 49th Missile Defense Battalion, move toward their objective as a team during a live-fire exercise at Fort Greely, Alaska.

One of the challenges the MPs face is maintaining System Security Level-A requirements on a complex that is still under construction. With a short construction season in the summer, the complex teems with contractors busy building the new portions of the system. Keeping these un-cleared workers out of areas where they should not be and escorting those who require access puts a strain on the MP's limited resources. Training is another challenge. Due to the rotating shifts they must work, collective training is often impossible to accomplish above the squad level. Yet, they must sustain proficiency on all mission tasks, maintain physical fitness, qualify on their weapons and execute an evaluated security exercise quarterly. They must be able to perform these tasks under inhospitable conditions. Something as simple as firing an M-9 pistol becomes challenging at minus 30 degrees and colder.

Test and Development Support

The GMD system is in a state of spiral development, so future block upgrades are in development now. The currently deployed system also undergoes periodic ground and flight testing as part of a comprehensive testing program. Operational crews participate in these test events from Fort Greely and other locations. The crews are able to provide valuable feedback to the developers from the warfighter's perspective. In turn, the crews are able to observe system behavior using operational components, and they get an early look at the next version of the system as it undergoes testing.



LTC Greg Bowen, 49th Missile Defense Battalion (Ground-based Midcourse Defense) commander, participates in the 'Double Dip' at Shemya, an island flanked by the Pacific Ocean and Bering Sea. To receive a 'Double Dip' certificate, participants must completely submerge themselves in both bodies of water. On the day Bowen took the plunge, air temperature was in the low 40s, with water temperature in the 30s.

Life at Fort Greely

Located in the interior of Alaska, Fort Greely is situated approximately five miles south of the town of Delta Junction and about 100 miles southeast of Fairbanks. The installation is small, with a total population of approximately 1,200. Fort Greely began as a Lend-Lease airfield during World War II, when it was used to ferry airplanes to Russia. Later it became the Army's primary cold weather test and training site. In 1995, Fort Greely was put on the Base Realignment and Closure Commission's list for closure. In 2001, Congress removed 7,200 acres from that list for the purpose of establishing a missile defense facility at Fort Greely. The Cold Regions Test Center is still a tenant organization today, testing everything from boots to Stryker vehicles in arctic conditions.

The weather at Fort Greely adds to the complexity of the mission. Summers are typically mild, but temperatures can soar into the mid to upper 90s, and while the sun technically sets, it does not get fully dark from May through August. Snow will begin falling in September, and the cold darkness of winter begins to set in. By December, temperatures are well below zero, with less than four hours of sunlight per day. Fort Greely continues normal operations until the temperature reaches minus 50 Fahrenheit. The coldest day on the Missile Defense Complex last winter was minus 54. Unfortunately for the Soldiers, they are considered "mission-essential personnel," and have to work regardless of the conditions.

While the weather might frighten less hardy souls, serving America from the "Last Frontier" does have its

Firing At The Same Target. *GEN Peter Schoomaker, Army chief of staff, congratulates SGT David Knotts, military police officer, 49th Missile Defense Battalion, on his marksmanship skills June 10. Schoomaker later signed the target claiming the misses as his. (Photo courtesy of The Eagle.)*

advantages. Postcards do not do justice to the beauty of this land. Soldiers working on the Missile Defense Complex are treated to stunning views of the Alaska Range during the day and the Northern Lights at night. The hunting and fishing in Alaska are world-class. The Soldiers, civilians and contractors who work on Fort Greely are a close-knit group, giving the post a "small town" feel. Due to its size, the installation does not have all of the amenities of a large post, but it does an outstanding job with the resources it does possess. The Morale, Welfare and Recreation program is tremendous, offering opportunities to get out and enjoy Alaska. Traffic is usually not a problem here, although at certain times of the year it's important to yield to moose and caribou on the highway!

As this article is being written, the GMD system is not yet on alert, but the Soldiers of the 49th are trained, certified and ready to execute as soon as the order is given. Our unit motto "Defending the Homeland" and unit designation number (Alaska is the 49th State) encompass what we are all about. We are Soldiers standing guard on the last frontier, and we will not fail.

LTC Gregory S. Bowen is the commander of the 49th Missile Defense Brigade, 100th Missile Brigade.

JTAGS

Army Theater Missile Warning

by MAJ Dave Price

Joint Tactical Ground Station and Army Space Support Team equipment is camouflaged during integration training at the Pinon Canyon Maneuver Site near Fort Carson, Colo., during Operation Warrior Rampage, June 2005.

The Army has worked over the past 15 years to rectify the theater missile defense early warning deficiencies that became apparent during Operation Desert Storm. In the process, the Army has successfully fielded the Joint Tactical Ground Station (JTAGS) and demonstrated the capability to fulfill Army, joint and coalition mission requirements for in-theater early warning support. JTAGS units will continue to fulfill critical early warning requirements as new early warning systems and capabilities, such as the Space-Based Infrared System, enter into service.

Warfighting commanders need a reliable, responsive and autonomous capability to provide direct downlink reports on tactical ballistic missiles using Defense Support Program satellites infrared data for early warning and alerting. The Joint JTAGS, a transportable information-processing system that receives and processes in-theater, raw, infrared data down-linked from Defense Support Program satellites and sensors, fills this requirement by dissemi-

nating warning, alerting and cueing information on ballistic missiles throughout the theater.

First tested in 1993 and fielded in 1997, JTAGS is now deployed as the in-theater component of the Theater Event System, which includes the Defense Support Program satellite constellation, Tactical Detection and Reporting System and the U.S. Air Force Mission Control Station. The Theater Event System coordinates all support systems, utilizing their individual strengths to offset vulnerabilities.

The JTAGS communication and data architecture includes the Integrated Broadcast System-Interactive and Integrated Broadcast System-Simplex. Other elements of the JTAGS architecture are the Joint Tactical Information Distribution System (JTIDS), the backbone of today's digital battlefield, and the Joint Range Extension capability. The JTAGS architecture also incorporates various voice and T-1 landlines. This architecture enables the JTAGS to provide ballistic missile warning and enhanced infrared coverage 24/7 and 365 days a year.

The 1st Space Company (Theater Missile Warning) has committed three of the available five JTAGS command operational systems forward to the field in Korea (Pacific Command), Germany (European Command) and Qatar (Central Command). JTAGS sections will remain in operation until the fielding of the Multi-Mission Mobile Processor (M^3P) is completed around fiscal 2010.[1]

JTAGS is operated by U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (SMDC/ARSTRAT) and the U.S. Army's 1st Space Brigade, which is headquartered at Peterson Air Force Base, Colo. The 1st Space Company (Theater Missile Warning) commands and controls three detachments and six sections with 109 officers and Soldiers deployed throughout the world. The U.S. Navy and the Naval Network and Space Operations Center supports JTAGS operations by providing 16 naval JTAGS operators and one officer outside the continental United States. U.S. Strategic Command has recently delegated operational control of JTAGS operations to the newly created Joint Functional Component Command-Space and Global Strike at Vandenberg Air Force Base, Calif.

The 1st Space brigade will re-task organize with four forward and one strategic reserve backup for multiple purposes, including operational responsiveness to all combatant commanders. This reorganization will have the added value of providing Soldier predictability, better permanent change of station rotations and enhanced family quality of life. The concept of operations for JTAGS provides for one detachment headquarters and one to two sections during peace or wartime activity. Today, the three detachments headquarters are in European Command and Pacific Command and at Fort Bliss, Texas. The remaining two operational (command systems) shelters are in Colorado Springs and at the U.S. Army Air Defense Artillery School, Fort Bliss.

The European Command detachment provides command and control for A Detachment/1st Section (A/1) in European Command at Stuttgart, Ger., and A Detachment/2nd Section (A/2) in Central Command (European Command and Central Command are mutually supporting theaters). C Detachment in Pacific Command provides command and control over one section (C/1) at Osan Air Base in Korea. B Detachment has the contingency operations and individual qualification training mission.[2] It provides command and control over the detachment headquarters at the Air Defense Artillery School and two contingency sections (B Detachment/2nd Section (B/2) at Fort Bliss (which has no TOE equipment) and C Detachment/2nd Section (C/2) in Colorado Springs, Colo.) All the allocations of A/2 personnel (15 Soldiers) currently reside in Colorado as well.

The problem set reflects that 100 percent of the JTAGS mission is forward in theaters supporting combatant commanders while 67 percent of the unit personnel are stationed in the continental United States. The 1st Space Battalion and the 1st Space Brigade have taken the initiative to task organize and re-station the 1st Space Company (Theater Missile Warning) subordinate elements to better support combatant commanders and take care of Soldiers life-cycle and deployment hardships. These measures include forward deploying a fourth JTAGS command system to Japan in the Pacific Command area of responsibility, which will provide the proper density of equipment and personnel and redundancy for that combatant commander. This fourth JTAGS command system will come from Colorado. Additionally, the personnel allocations for A/2 will move from Colorado to European Command, where the detachment commander can provide the best support and command relationship to the Central Com-

[1]The Multi-Mission Mobile Processor (M^3P) is a replacement to the Joint Tactical Ground Station (JTAGS) currently operational with the U.S. Army Space Command. Delivery has been moved to FY 2010 to incorporate operational requirements not planned for in a Defense Support Program capable M^3P system. The M^3P system is a ground- and space-based system that will provide direct downlink from the Space-Based Infrared System (SBIRS) satellites in highly elliptical and geosynchronous orbits, once the satellites are launched. SBIRS sensors will have faster scan rates and greater sensitivity. The Army will eventually field six M^3P systems to replace JTAGS. The system provides early warning and cueing information on tactical ballistic missiles; battlespace characterization and other events of interest in near real-time. Reports provided to Space Command include missile type, launch point, time, azimuth, and predicted impact point.

[2]1st Space Company manages individual qualification training (IQT) at Fort Bliss, Texas, and provides trained JTAGS operators and sailors to the field, using one of the operational shelters. Additionally, the Navy sends reservists to the JTAGS IQT and, periodically in the summer, they support JTAGS forward units with these sailors during their annual training. IQT will move underneath the SMDC/ARSTRAT Future Warfare Center (FWC) and Directorate of Combat Development, which executes U.S. Army Training and Doctrine Command requirements. This final shelter will be retained by the 1st Space Brigade in a Memorandum of Agreement with the FWC in the event of a catastrophic loss of another forward JTAGS command system. This fifth system is operationally available for unforeseen operational requirements.

At left, SGT Matthew Zellmer and SSG Samuel Anderson set up a Joint Tactical Ground Station (JTAGS) antenna at Fort Carson's Pinon Canyon Maneuver Site. At right, PFC Jeffrey Englert and Naval Operations SPC Jay Howard man the JTAGS in Korea, providing tactical ballistic missile warning for the Pacific Command Theater.

mand JTAGS site. Lastly, the contingency mission will no longer be necessary and the B Detachment personnel will be task organized under both the A and C Detachment banners to maximize training and operational requirements. This will effectively eliminate augmentation and deployment requirements from the continental United States sites.

On the surface, the solution described above appears to counter the Department of Defense strategy of reducing or returning forward-deployed forces to the United States, where they will be reorganized as units of action. Units of Action are designed to have a training base and a deployable platform from which they are to be prepared to deploy once every three years. But the reality of the moment is that the mission (Operation Iraqi Freedom, Operation Enduring Freedom, Sinai, etc.), is abroad, and JTAGS operators must maintain an indefinite presence forward until forward-deployed units actually relocate to the United States.

In the future the JTAGS system will continue to provide combatant commanders with a system that is relevant and decisive. The JTAGS will be eventually integrated into limited defensive operations (LDO) and ballistic missile defense systems (BMDS) as an early alerting and queuing system. This will provide commanders with a continuous, assured, ballistic missile early warning and queuing system in theater. As both an insurance policy and force multiplier, JTAGS supports all tenants of global missile defense: attack operations, active defense, passive defense and battle management command, control, communications, computers and intelligence. In-theater missile defense remains viable today, as it will for the next 10 to 15 years. This mission set includes strategic and tactical ballistic missile warning for centimetric early warning, enhanced infrared coverage and support of LDO and BMDS and other strategic classified missions.

In summary, the contingency mission may be reduced or eliminated due to the advent of a fourth system forward, which would give each combatant commander or combined joint task force commander coverage with a primary and backup system available to cover all areas of interest in theaters where ballistic missile attacks are probable. The areas that would not be covered would be those with little or no possibility of ballistic missile attack, and most of these could be covered with existing JTAGS units already in place. This would allow two JTAGS detachment headquarters to provide hemispheric support to all combatant commanders with A Detachment maintaining support in the Western Hemisphere and C Detachment providing the same in the Eastern Hemisphere.

Thanks to the technical enhancements and the constant upgrades of JTAGS shelters data and voice architecture and improvements in initial training of crews, the JTAGS will continue to play a valuable non-doctrinal role in Army theater missile warning until the delivery of the M^3P system.

MAJ Dave Price commands 1st Space Company (Theater Missile Warning), Joint Tactical Ground Station.

SCANNING

Oldest ADA Battalion Inactivates

The 1st Infantry Division held an inactivation ceremony on 15 September 2005 at Wurzburg, Germany, for the 4th Battalion, 3rd Air Defense Artillery, the oldest air defense battalion in the active Army. Some 4-3 ADA Soldiers have been assigned to the division's new Air and Missile Defense Detachment, will provide early warning and airspace management, functions previously performed by the ADA battalion. Other 4-3 ADA Soldiers will be reassigned to composite air and missile defense battalions or reclassified into other military occupation specialties.

JOINT BLUE FORCE SITUATIONAL AWARENESS

Helping Save Warfighter Lives and Improve Operations Through Information Integration

by John Brophy and Preston A. Cooper

Warfighters in Afghanistan and Iraq had many tools to help them prosecute the war more effectively than ever before possible. Technology development programs in recent years have greatly improved our forces' ability to understand their own situation through the use of Global Positioning System-based tracking systems. In short, they used newly developed Blue Force Tracking (BFT) systems to establish blue force situational awareness (BFSA). As our forces learned to use and, indeed, depend upon the information provided by these systems, they realized that entirely new challenges had arisen.

Warfighters in Afghanistan and Iraq use newly developed Blue Force Tracking systems to establish Blue Force Situational Awareness.

While these systems provided a wealth of new data, they were all developed in a traditional stovepipe fashion. This meant that warfighters could see only some of the friendly forces on the battlefield. For example, in some cases they could not see either the logistics forces that were supporting them or coalition forces that they were fighting alongside. The inability to produce a single, accurate, common operational picture at any strategic, operational or tactical level limited the overall utility of BFSA. Additionally, when a warfighter did have access to limited BFSA, he still experienced a challenge in using the data because he was unable to select and display data that was relevant to his mission. In short, warfighters were often drowning in the wrong type of data.

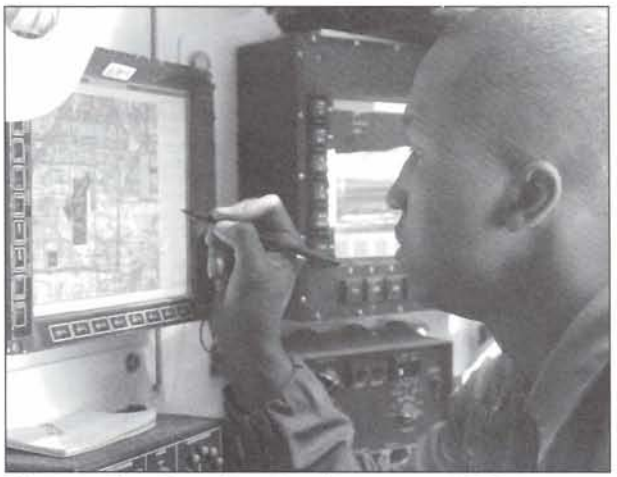
It was in this environment that the Joint Requirements Oversight Council chartered the Joint Blue Force Situational Awareness (JBFSA) Advanced Concept Technology Demonstration (ACTD) in 2002. Given the critical impact on the warfighter, the JBFSA ACTD was put on an accelerated schedule to develop and demonstrate technology to integrate and disseminate information from the large family of military and commercial BFT stovepipe systems used by the U.S. military. The goal was to provide an integrated Blue Force picture to the warfighter, using equipment they already had, and were already trained to use. Thus the integrated information developed by the ACTD's hardware and software was designed to use the Global Command and Control System (GCCS)-Joint, developed by the Defense Information Systems Agency, for dissemination to all levels of warfighter. The GCCS family of systems in use in theater by each service can then distribute the relevant common operational picture information down to various organizations and individual warfighters.

The operational manager and transition manager for this ACTD is U.S. Army Space and Missile Defense Battle Lab (SMDBL) in Colorado Springs, Colo. Leading the JBFSA team is U.S. Army LTC Gregory Palka. Working closely with the Defense Information System Agency's technical manager, the JBFSA team successfully completed the ACTD's demonstration phase, including participation in Exercise Foal Eagle 2004 in South Korea. Palka and his team were so successful in overcoming the institutional, technical and schedule challenges, that he was honored with the ACTD Operational Manager of the Year for 2004 Award by the under-secretary of defense for Advanced Systems and Concepts, an accomplishment he credits more to the government/contractor team that supports him than to himself.

The JBFSA ACTD developed a concept of operations and supporting technology that uses the Internet to receive BFT information from a half-dozen unclassified military and commercial systems. After integrating this unclassified information together, the ACTD technology allows the Mission Management Center (MMC), which is operated by U.S. Army Space and Missile Defense Command/ U.S. Army Forces Strategic Command at Peterson Air Force Base, Colo., to disseminate a complete BFT operational picture to various users via a number of different communications paths.

Having completed the demonstration phase, the JBFSA team is now focusing on a variety of efforts de-

signed to "operationalize" the technology that was demonstrated. The JBFSA ACTD is currently executing the ACTD's extended user evaluation (EUE) phase, which runs through FY05 and FY06. Based on the experiences gained during Exercise Foal Eagle 2004, the ACTD Operational Manager Team is working closely with U.S. Pacific Command and the U.S. Eighth Army to conduct a large part of the EUE within Pacific Command and in the Korean theater of operations during exercises Foal Eagle 2005 and Talisman Saber 2005. While these won't be the only operational venues that the ACTD plans to use during the EUE period, most of the elements needed to conduct a successful EUE are readily available in Pacific Command and the Korean theater of operations. Supporting these EUE exercises is a dedicated team based in Colorado Springs that is striving to turn high-maintenance developmental hardware and software (installed at the Space and Missile Defense Battle Lab's MMC Testbed) into low-maintenance operational hardware and software.



The Joint Blue Force Situational Awareness (JBFSA) Advanced Concept Technology Demonstration (ACTD) uses the Internet to receive BFT information from a half-dozen unclassified military and commercial systems.

In addition to the EUE effort, the JBFSA team is working closely with British allies to share JBFSA information with them. Under the Coalition Blue Force Situational Awareness project arrangement with United Kingdom Ministry of Defense, the U.S. JBFSA experts are working closely with Ministry of Defense staff and contractors to develop and demonstrate the operational and tactical level exchange of BFSA data between the U.S. systems and the United Kingdom's Bowman tactical communications and situational awareness system. This effort, in its second year, was recently successful in exchanging BFT data in a U.S. laboratory setting. Technical trials continue through June 2005 and culminated in operational demonstrations in June and September in the United Kingdom. A similar effort is also being undertaken with our NATO coalition partners as part of the 2005 NATO Coalition Warrior Interoperability Demonstration in Norway. While the NATO demonstration will be key to demonstrating the ability to share information, a far more important outcome could be to establish a defacto international standard for formatting BFT data, which could ultimately eliminate need for the ACTD's message translation technology.

Finally, the JBFSA team is also working with a variety of combatant commanders to "operationalize" the ACTD capabilities in support of ongoing operations. In January 2005 the ACTD team supported U.S. Northern Command by providing BFSA support during the week of the President George Bush's second inauguration. The team is also working with Joint Forces Command to test and deliver a JBFSA operational capability in support of U.S. Central Command's warfighters in Iraq and Afghanistan. Software upgrades and testing during spring 2005 led to an operational system that will give commanders a vastly improved situational awareness of their forces, which in turn, will help reduce fratricide.

While a large number of systems have been developed to provide unit commanders with knowledge of their own forces, these systems were not developed with an eye toward interoperability. The JBFSA ACTD has pioneered new ground in establishing a path for the exchange of data between stovepiped systems. Providing the tools for interoperability will address many short-term needs, but the ACTD's long-term legacy will have been to both demonstrate the art of the possible and to establish standards for data exchange that will long outlive the actual technology developed to make the exchange happen today.

John Brophy is a Department of the Army civilian serving in the Space and Missile Defense Battle Lab. He is the lead for the Coalition Blue Force Situational Awareness project. A civil servant for more than 14 years, he has worked as a physical scientist at the National Institutes of Health and the Environmental Protection Agency. He has degrees in chemistry from the Virginia Polytechnical Institute and State University and the University of Notre Dame.

Preston A Cooper is a U. S. Army contractor providing system engineering services to the Space and Missile Defense Battle Lab in support of JBFSA under the STARS contract. A former Air Force satellite operations officer and trainer, he is the chief technical officer of Ingenuity Research Corporation and has physics degrees from both Harvey Mudd College and the University of Colorado.

SCANNING

94th Army Air and Missile Defense Command Activation Scheduled

An activation ceremony for the newly organized 94th Army Air and Missile Defense Command (AAMDC) is scheduled for 14 Oct 2005 at Fort Shafter, Hawaii. Commanded by COL John E. Seward, who has been nominated for appointment to the rank of brigadier general, the "First Line of Defense" command is the Pacific region's newest theater missile defense unit.

Enhancing Joint Command and Control of Army Space Forces

How Army Space Assets Will Support the Ground Component Commander

by BG Jeffery C Horne, COL Kurt S. Story and MAJ (P) Troy McKeown

Managing and allocating the United States' space assets is a dynamic and fluid discipline that demands interaction with all branches of the armed services, a myriad of "three-letter" national agencies within the intelligence community and other organizations. As the 1st Space Brigade (Provisional) approaches its modified table of organization and equipment fielding date of 16 October 2005, it is working to develop doctrine, tactics, techniques and procedures (TTPs), and command and control relationships for today's and tomorrow's space operations across the spectrum of conflicts within the joint realm.

Exercise Ulchi Focus Lens, South Korea. Gunnery SGT Roosevelt Dunn, left, and Gunnery SGT Michael Lambuth, of the 3rd Marine Expeditionary Force review a satellite imagery map provided by the 2nd Space Company, 1st Space Battalion. At right, SPC Joseph Sullivan of 2nd Space Company checks the cables on a satellite dish used to provide support to III Corps, deployed near Yongin, South Korea. (Photos by Michael L. Howard)

Space Coordinating Authority

During combat operations, the space authority, as defined in Joint Publication 3-14, *Joint Doctrine for Space Operations*, which is commonly referred to as the Space Coordinating Authority (SCA), will coordinate space operations, integrate space capabilities and have primary responsibility for in-theater joint space operations planning.

> *The space authority can be retained at the Joint Task Force (JTF) HQ's [headquarters] or delegated to a component command. In this position, the space authority designated by the Joint Force Commander (JFC) will coordinate space support of theater objectives and act on behalf of the combatant commander with primary responsibility in theater for joint space operations planning.*[1]

A number of factors are essential in designating the SCA component. The first and foremost is the preponderance of space forces in theater. Defining "space forces in theater" is an interesting, multi-faceted discussion. Should satellites that service joint force commanders globally be considered a theater asset? Is a satellite focused exclusively on a particular mission area for all theaters a theater space asset? Who "owns" the support structure that flies, manages payloads and maintains the satellite part of the space infrastructure? It could be argued that these three functions belong to strategic space forces. It is a stretch to include them in the theater space forces for one major reason: mission planning and execution for these assets are not done in the theater; they are globally focused, multi-mission assets.

Another factor that should be considered when designating SCA is the type and scope of operations. To date, the SCA has always been granted to the air component commander. Yet, the priority of effort for many of these operations has been the ground component with the air component playing a supporting role. The joint community should investigate moving the SCA to reside with the ground component during these operations rather than placing it with the air component.

Joint Functional Component Command For Space & Global Strike

The SCA's link to many space assets is through the newly formed Joint Functional Component Command for Space and Global Strike (JFCC-SGS), the Joint Space Operations Center (JSpOC), and the Joint Commander-Space Operating Forces. The JFCC-SGS is U.S. Strategic Command's mechanism for planning, executing and synchronizing space capabilities.

> *While the Space Coordinating Authority may facilitate non-traditional uses of space assets, the JFCC-SGS should utilize the established processes for planning traditional Space Force Enhancement missions — intelligence, surveillance and reconnaissance; integrated tactical warning and attack assessment; environmental monitoring, communications, and navigation and timing.*[2]

Normally the JFCC-SGS supports a combatant commander's component commander who retains the SCA

[1] Joint Publication 3-14, *Joint Doctrine For Space Operations*, pg. ix
[2] Joint Publication 3-14, *Joint Doctrine For Space Operations*, pgs. III-2, III-3

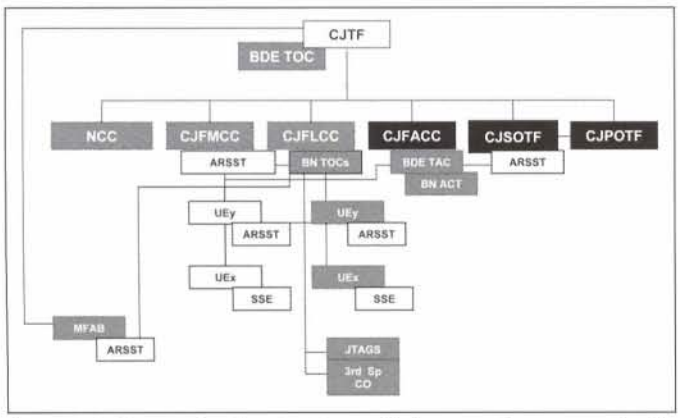
role. It is comprised of staff personnel with expertise in space control, space force enhancement, space force application, and space support with augmentees from the other services and Department of Defense organizations. As Strategic Command's mechanism for strategic planning, executing, and synchronizing space capabilities, the JFCC-SGS has further delegated the execution authority and responsibility to its space component and the joint space officer who execute through the JSpOC.

As this relationship with the JSpOC matures, so will the space support we provide to the theater land component commander. Space situational awareness will continue to improve. This relationship will increase our capabilities to maintain knowledge of all space systems, not just Army systems. It will provide us access to more analysts performing space-based intelligence estimates; thus making it easier to maintain awareness of enemy space systems and their capabilities.

Evolving Theater Space Support

The road ahead is filled with many challenges and the journey will force space professionals to redefine the theater space support structure. Army Space and Missile Defense Command/Army Strategic Command (SMDC/ARSTRAT) is in the process of redefining the new Army space support structure requirement for both current theaters of operations and future capabilities. As the requirements and capabilities are defined, the command must figure out how to employ them efficiently.

The primary mission of Army space forces is to support the land component commander in support of the joint force commander's campaign plan. Recent experience in Exercise Ulchi Focus Lens demonstrates our need to be prepared to also support coalition forces. During the September 2005 Ulchi Focus Lens Exercise, the command put space elements with the 1st and 3rd Republic of Korea armies. To meet the growing support requirements with the current space force structure, mission analysis becomes ever more critical. SMDC/ARSTRAT is also developing smaller, but tailored, teams to provide space support to the warfighter.



Proposed changes in the structure will improve the support to the ground component commandeer by refocusing efforts on the battlefield.

Proposed 1st Space Brigade Support

Real-world experiences and exercise support have enabled us to refocus our theater warfighting concept, brigade task organization and subordinate unit mission statements. As the brigade redefines its TTPs and concepts, it is developing a template to craft a space support plan for each theater. Because the threats and concept plans for the major theaters are different, support for each must be customized prior to executing an operation or an exercise.

Recent experiences in exercises Ulchi Focus Lens, Sharp Focus and Terminal Fury, and deployments to Iraq and Afghanistan in support of Operation Iraqi Freedom and Operation Enduring Freedom have provided several lessons. First, the use of non-doctrinal terms to identify the elements that deploy forward causes confusion among the warfighting community. Second, while every mission is different, we now better understand the joint force commander's information requirements and task organization to best support ground force commanders.

The brigade will deploy its brigade tactical operations center (TOC) to the joint task force (JTF) commander and deploy its tactical command post (TAC) to the component that retains SCA. The battalion element or TOC will locate with the ground component commander. The battalion will then pick up the requirement to attach an air coordination team to the brigade TAC to support the brigade's role in information operations.

Proposed changes in the structure will improve the support to the ground component commandeer by refocusing efforts on the battlefield. Placing the brigade TOC at the joint task force headquarters will allow the brigade commander to influence and direct the priorities of Army space support. For example, this gives the brigade commander the ability to coordinate for cross-leveling or changing the priority of support across different components within the task force. By placing a battalion TOC at the ground component commander's headquarters, we will improve the structure to allow better integration into the ground component commander's battle rhythm to ensure

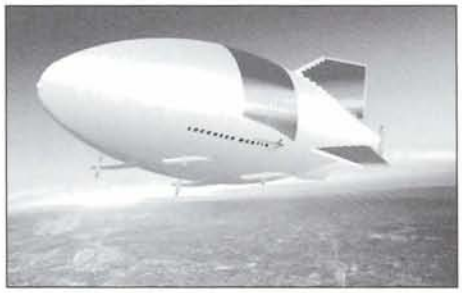
CPT Daryl Breitbach, standing, of the 193rd Space Battalion, Colorado Army National Guard assists Air Force CPT Charles Alanzo, a member of the joint forces deployed to Seoul, South Korea, during Exercise Ulchi Focus Lens. (Photo by Michael L. Howard)

that we are capturing the space requirements. This will allow planners to fully integrate space requirements into the initial planning phases.

Evolving Capabilities

Emerging capabilities offer opportunities for Army space forces to harness existing strategically oriented space capabilities with critical space-based force enhancement capabilities and bring those capabilities to the tactical arena in the areas of intelligence, surveillance, and reconnaissance (ISR), communications and positioning/ navigation. Future capabilities will also allow the Army to apply space power from tactically oriented space platforms to perform space control, apply near-space toolsets, improve persistent ISR and communications, and enhance space and situational awareness.

The near-space arena offers exciting tactical possibilities in the future for all Army space forces. Near-space platforms, such as high-altitude airships, provide a persistent loitering capability that increases the Army space warrior's capabilities in three areas. Certain payloads could provide a persistent ISR source. This would increase the maneuver commander's ability to plan and destroy enemy forces, while reducing friendly casualties. Geospatial data will be more readily available to aid in building maps and various other topographic products. Lastly, the platform could provide a long-range communications platform that could alter the way the Army looks at re-transmission and greatly extend the range of conventional radios.



High-altitude airships provide a persistent loitering capability that increases the Army space warrior's capabilities. (Lockheed Martin photo)

Conclusion

In preparation for future changes the Army is constantly reevaluating how it supports the warfighter to incorporate changes to the evolving joint space support construct while preparing to deliver new capabilities to the battlefield. The resulting infrastructure integrates personnel with complete space expertise at all echelons of the chain of command. The overarching objective is to get the benefits of space effects down to tactical level units to give our Soldiers an overwhelming force multiplier on an ever-changing battlefield.

BG Jeffery C. Horne is the U.S. Space and Missile Defense Command deputy commanding general. COL Kurt S. Story commands the 1st Space Brigade. MAJ (P) Troy McKeown is the 1st Space Brigade's operations officer.

Joint Functional Component Command for Space and Global Strike Functions

- **Gains** and maintains space superiority through centralized command and decentralized execution of joint space operations when assigned to support global or theater joint force commanders.
- **Conducts** space combat planning and directs space combat operations across the spectrum of conflict by planning, synchronizing, tasking, integrating, and assessing execution of assigned and attached worldwide space forces (including U.S. Strategic Command Unified Command Plan space missions).
- **Applies** space functional concepts, coordinates and, when designated a supporting commander by appropriate authority, provides full spectrum of space effects/capabilities to supported commanders through the operational or administrative chain of command.
- **Provides** operational estimates, courses of action, intelligence summaries and weather support.
- **Produces**, distributes and executes space tasking orders to produce space combat effects in worldwide operations.
- **Operates** and sustains the air and space operation center as the primary command and control node of space forces.

Improving Space Training

A Career Model for FA 40s

by MAJ Robert A. Guerriero

Training is the foundation that our professional Army is built upon. Starting in pre-commissioning training and continuing throughout an officer's career, achieving and maintaining excellence in today's Army is a constant learning process. Formal training courses, in conjunction with unit training, training exercises, professional development programs and senior-leader mentorship are key components in the development of confident and competent officers. This is as true for Function Area 40 (FA 40) Space Operations, officers as it is for any branch or specialty in the Army. FA 40 training has continued to evolve and improve since Space Operations was established as a functional area in 1998. As we continue to refine our space training process, we should ensure that the FA 40 career model supports the training and development of our space officers throughout their careers.

LTG Larry J. Dodgen, commanding general, U.S. Army Space and Missile Defense Command, discusses the state of the Space Operations career field at the FA 40 Traning Conference in Long Beach, California.

There is no doubt that the nation and the Army need well-trained space professionals. Undersecretary of the Air Force Peter B. Teets, the Department of Defense's Executive Agent for Space, recently stated that in order for the United States to achieve space dominance, we need a strong and enduring commitment in several areas. "The first, and unquestionably the most important, is the development and maintenance of a strong professional cadre of military and civilian government personnel," he said.[1] The Army also recognizes the need for a trained cadre of space professionals. The Army Space Master Plan states, "The Army must have a well-trained and innovative cadre of space-literate personnel who understand warfighting requirements and the benefits that space can bring to the Army."[2] The establishment of Space Operations as a functional area was a first step toward achieving this goal. The FA 40 community has made substantial progress in establishing a sound training program to build its cadre of space-literate personnel. A critical component of this training program that we must cultivate is the space experience that will make our professional cadre true space experts.

The current training program for FA 40s consists of the 11-week Space Operations Officer Qualification Course (SOOQC) taught in Colorado Springs, Col. This course will soon be expanded to a 12-week curriculum. SOOQC is an excellent introduction to a wide range of space systems and space capabilities, and also provides an introduction to the roles and responsibilities of FA 40s. A planned enhancement of the SOOQC is the incorporation of the Air Force's Space 200 course. This will provide an even better understanding of space capabilities and offer insights into joint space operations. The SOOQC is a good start for an FA 40, but it does not, nor was it designed to, produce a space expert. An FA 40 who completes SOOQC has a solid base of training to build upon and is prepared to continue the training process to become a space expert. SOOQC produces space officers with a great breadth of knowledge, so the challenge for the Army Space community is to increase the depth of this knowledge in every FA 40.

Following SOOQC, many FA 40s are assigned as Space Operations officers on corps and Army staffs, or as members of Army space support teams (ARSSTs). With the rapid transition from divisions to units of employment (UEs), many FA 40s are also being assigned to these staffs as members of space support elements (SSE). These are some of the most important and visible positions within the Army Space community, because the Space Operations officers, SSEs, and ARSST leaders are the ones who must deliver our space capabilities to the warfighters. The value of FA 40s to the Army will in large part be judged by what these officers can bring to the fight.

There is some formal space training for FA 40s that can be found outside of SOOQC. The 1st Space Battalion, for example, has established a certification process for its ARSST leaders and conducts individual and unit training to build space skills. A collective training and staff integration program has also been established for SSEs. As the Army space community gains more experience in employing space capabilities, this training will continue

[1] *Teets, Peter B., Speech at the 2004 Air and Space Conference and Technology Exposition, 14 Sep 04.*
[2] *Army Space Master Plan, p. ES-2.*

to evolve and improve.

When an FA 40 arrives at a corps or a UE, he or she is expected to be a space expert from the start. FA 40s working on a corps or UE staff generally don't have the luxury of being able to grow into their jobs, but must be immediately able to clearly and convincingly articulate the added value that they bring to the unit in terms of space capability. A failure to do this has significant consequences for the individual, the unit, and for the FA 40 community as a whole.

An FA 40 that cannot convince a corps or UE that space capabilities enhance the unit's ability to accomplish its mission runs the risk of not being dedicated to providing space support. This officer will likely be assigned other duties, with little time left to integrate space into the staff planning process, or to develop professionally as a Space Operations Officer. This compounds the problem, because the FA 40 loses the opportunity to master a highly specialized skill set, and that unit continues to have the false impression that there isn't a large benefit to be gained through space capabilities. This has implications beyond individual Space Operations officer being misused. The result of an assignment like this is that the FA 40 in the field gets experience, but not space experience. The FA 40 community, as a whole, suffers from the loss of space experience from the field that could be use to develop and train its space cadre.

At left, GEN Peter J. Schoomaker, Chief of Staff of the Army, presents CAPT Angie Tofflemeyer with the prestigious GEN Douglas MacArthur Leadership Award during a ceremony at the Pentagon 25 May 2005. Tofflemeyer, at right, an ADA officer, commands the Space Support Company, 193rd Space Support Battalion, Colorado Army National Guard.

Unfortunately, based on conversations with many FA 40s, assignment of Space Operations officers to areas outside of space functions seems to be a systemic problem in Army units. This may be an indication that there are some shortfalls in the preparation of the FA 40s who are expected to deliver space support to the warfighter.

One shortfall that might contribute to this problem is in the area of national space assets. A significant and critical portion of our space capability is resident with national systems, yet for the most part the Army's professional space cadre does not get enough exposure to these systems. Although national space assets represent a subset of U.S. space capabilities, we must understand the capabilities, limitations and means of employment of national assets just as thoroughly as we understand all other space assets. Part of our credibility as space experts is based on the fact that we have a working knowledge of all space capabilities, not just some capabilities. An FA 40 who understands and can employ all space capabilities is in a much better position to describe the benefits of space support than an officer with substantial gaps in knowledge concerning some constellations.

Another indication of a possible shortfall in the preparation and training of FA 40s is in an August 2004 Government Accountability Office (GAO) study that examined the Department of Defense's space human capital strategy and the status of efforts by all of the military departments to develop their space personnel career fields. The report found the Defense Department lacking in its plan to develop space professionals. The GAO report stated "Because the Army and the Navy lack a strategy to provide direction and focus for their efforts to develop their space cadres...it is unclear whether they will have enough space-qualified professionals to meet future requirements in joint and service space planning, programming, acquisition, and operations."[3] Whether the conclusions in this report are valid or not is an open question, but the point of this particular statement is accurate and points to a legitimate concern: If we do not develop and adhere to a strategy that produces a knowledgeable and experienced space cadre, then we will not have enough space professionals to meet our future requirements.

Both of these potential shortfalls—lack of exposure to some important space systems and the lack of a clear long-term professional development strategy—can be overcome with a career model that provides space training, experience and mentorship for every FA 40 throughout their career. Becoming an expert on space assets and their capabilities and understanding how to integrate space with operations require focused and dedicated effort over time. While formal training courses, annual seminars and individual professional development are important parts of this process, there is no substitute for hands-on, day-to-day space experience. Cultivating this type of space experience in our FA 40s will put each one in a position to develop professionally as a space expert for the Army. We must ensure that the FA 40 career path gives every Space Operations officer this opportunity. This will keep the Army's space cadre on a path to long-term success.

Space Operations officers can learn many of the details of their profession through assignments to sites where the majority of our nation's space work is accomplished. This includes the National Reconnaissance Office (NRO), National Geospatial-Intelligence Agency, National Secu-

[3]*Defense Space Activities: Additional Actions Needed to Implement Human Capital Strategy and Develop Space Personnel*, United States Government Accountability Office, August, 2004, p. 20.

rity Agency, satellite program offices such as the Global Positioning System or Milstar military communication satellite program offices, our space launch facilities and any of our ground stations that support satellite constellations. These space organizations and facilities are filled with our country's true space experts who have spent years designing, building, launching, operating and exploiting any satellite that the United States has ever launched. Working in a space organization or space support facility can give an FA 40 first-hand experience in what a satellite is capable of, how it can be employed effectively, and how it is supported from the ground.

Once an individual is assigned to any one of these space organizations, the information exchange is excellent. Information on almost any aspect of any satellite built, operated, or employed by that organization is readily available. There are internal training programs to educate personnel in the organization and help to maintain their skills. Many of the assigned military and civilian personnel have worked on multiple space programs during their careers and can offer insights into a wide range of space capabilities. An FA 40, eager to learn, can quickly become a space expert. Furthermore, these organizations embrace the idea of providing space support to the warfighter. They welcome ideas from people with operational experience and will take the time to make sure that anyone who needs to leverage their particular capability has the knowledge to do so. An assignment to one of these organizations, combined with the operational knowledge that FA 40s already possess, will prepare an officer to truly leverage as much as possible from space assets and deliver space support to the warfighter. Assignments to space organizations will provide space cadre with a depth of knowledge that can never be gained from training courses.

Even officers who are not assigned to space organizations can take advantage of the training they offer. The NRO and National Geospatial-Intelligence Agency offer classes on each of their different types of satellites nearly every quarter. These classes last about two days each and go into detail about every aspect of that particular satellite constellation. The majority of the information can be presented at security classification levels that FA 40s already have. The Army Space community should send officers on a regular basis to attend these classes. FA 40s can attend similar classes offered at many ground stations. The NRO classes can be facilitated through the Operational Support Office or the Army Coordination Team at the NRO. Other organizations have similar outreach divisions that can assist.

A career model that will ensure that each FA 40 is properly trained is critical to the success of the Army space community. The career model proposed in this article would annually place about one-third of new FA 40s into national organizations, program offices, or space support facilities, and one-third into ARSST leader positions. The remaining third would go to corps or UE staffs, and serve under a senior FA 40 who is already an expert in the employment of space systems. We must pursue the right number of personnel positions in the right places to support this career model, and the number of positions should grow as our Space community grows. Placing Army officers in space organizations is no less critical than placing space officers in Army units. The long-term success of our space cadre depends on a steady supply of experience from these space organizations.

A good second space assignment for an FA 40 would be as a Space Operations officer or as the senior member of an SSE. The senior officer in an SSE, after gaining experience in applying space capabilities at a space organization or as an ARSST Leader, can then train and mentor the new FA 40s on the team. Similarly, an ARSST leader in a first space assignment can learn from an experienced Space Operations officer. This career path model ensures that there is a constant source of space training and space professional development throughout an FA 40's career.

TABLE 1. POTENTIAL FA 40 CAREER MODEL

1st ASSIGNMENT	2nd ASSIGNMENT	3rd ASSIGNMENT +
National Organization/Program Office/Space Support Facility	Space Operations Officer (CORPS)	Army Staff
Space Support Element	Space Support Element Leader	Joint Staff
ARSST Leader	National Organization/Program Office/Space Support Facility	SMDC/FWC
	SMDC/ARSTRAT	National Organization/Program Office/Space Support Facility
		SMDC/ARSTRAT

Another advantage to this model is that, while it ensures that there is a steady flow of experienced space professionals moving into key space positions in the Army, it also infuses operational experience into the national-level organizations and program offices where emerging space capabilities are being designed and built. The organizations that are developing our next generation of satellites need input from Army officers with solid operational experience. The Army is depending on its professional space cadre to speak for the warfighter at the national level. Table 1 illustrates this potential FA 40 career model.

Another important benefit of placing a trained FA 40 into a Space Operations officer or SSE leader position is that officer can immediately educate the unit leadership about what space support can and can't do. To do this effectively, an FA 40 must have a solid understanding of the capabilities and limitations of all space assets, to include national assets, and needs the depth of understanding that

comes from experience, not from course attendance or reading space related publications. The unit commander and staff can then clearly understand how to employ a Space Operations officer or SSE leader, and what benefit the FA 40 brings to the battlefield.

The risk with this career model is that we cannot afford to have FA 40s in Army units that are not serving in a space capacity. Misuse of Space Operations officers in the field will interrupt the flow of space experience back into the FA 40 community. This model does not eliminate the risk of FA 40s assigned to Army units being used primarily for non-space functions, but it ensures that every Army unit has at least one experienced FA 40 to articulate the benefits of dedicated space personnel. Unfortunately, even after being thoroughly informed as to the capabilities and benefits of space support, some units will choose to use their assigned FA 40s in some function other than Space Operations as their primary area of responsibility. An officer in a position like this should be reassigned as soon as possible, with no replacement. The vacancy should not be filled until the unit realizes that they need space support and requests another FA 40. The misuse of an FA 40 with a highly specialized skill set interrupts that officer's professional development at a critical point in his or her career, and puts that officer in a poor position to train others in the future. Furthermore, misusing a scarce resource like an FA 40 space professional enies other units the ability to effectively leverage space support.

...we must ensure that every FA 40 possesses the skills necesssary to leverage all our space assets.

The long-term success of the Army Space Operations community depends on our ability to develop a well-trained cadre of space professionals. As the Army's space experts, we must ensure that every FA 40 possesses the skills necessary to leverage all of our space assets. We have made great strides toward achieving this already, and space training and professional development continue to evolve, adapt, and improve. One way to continue to improve our space training is to establish and adhere to a career model that gives every Space Operations officer the opportunity to train and develop as a space professional. This strategy will provide our space cadre with a depth of knowledge that matches our breadth of knowledge.

MAJ Robert Guerriero is the III Corps Space Operations Officer, currently deployed to Iraq. He was previously assigned to the National Reconnaissance Office's Advanced Systems and Technology Directorate. MAJ Guerriero is a graduate of the Space Operations Officer Qualification Course. Comments and feedback are welcome (robert.guerriero@us.army.mil).

The Air Defense Artillery Association

The Air Defense Artillery Association is a private, non-profit organization whose mission is to benefit active and retired Air Defense Artillery soldiers.

The goals of the Association are:
• **Foster** a spirit of unity and *esprit de corps* among members of the branch;
• **Support** the Air Defense Artillery Museum and the Fort Bliss Museum and Study Center and other programs of the Museums Division.
Visit our website (firsttofire.com) and use our secure Online Membership Form to join the ADA Association.

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Measurement & Signatures Intelligence

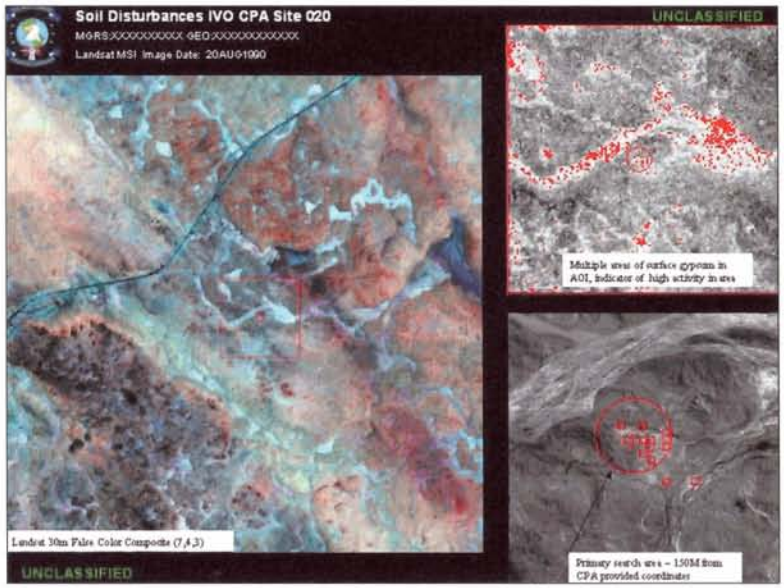
A Real-Life Version of *CSI Miami*

by Ed White

During a recent 'town hall' meeting used to inform Space and Missile Defense Command (SMDC)/Army Strategic Command (ARSTRAT) Soldiers, civilians and contractors on the state of the command, Deputy G2, LTC Michael Childers, gave a briefing that was both entertaining and prophetic. The briefing compared the current and future activities and capabilities of the Spectral Operations Resource Center (SORC) to the abilities of the investigators on the television show CSI: Miami. *This planted the idea of CSI: Space*

"I came up with that comparison for crime scene investigation on my way up to the stage to do the briefing," Childers said. "I thought it was a good analogy."

The CSI: Miami *team's expertise at taking a unique look at evidence and using all the technologies available to them, makes them extremely effective—on television. Childers opined that the SORC is the real-life CSI: Miami for the warfighter, noting the television show details the newest and highest level of technology available to solve crimes and provide evidence to be used to convict a guilty person.*



Crime Scene Investigation: Spectral imagery supplied by the Spectral Operations Resource Center revealed the location of mass gravesites in Iraq.

The CSI: Miami *technology is real. The show is fiction.*

Childers said that CSI: Space or Geospatial Intelligence and, in particular, Measurement and Signatures Intelligence (MASINT) are real world, ever-growing and expanding capabilities that allow our forces to see the battle space in a whole new way. He feels that these capabilities offer commanders a new paradigm and more possibilities than ever before.

"Combined with the entire field of geospatial capabilities, MASINT offers a powerful tool for planners and commanders," he added.

And what we are capable of today is just the beginning.

Our interest was piqued and we sent Ed White to get the "rest of the story."

The simplest ideas are usually the best and they come from simple, basic questions. For instance, Einstein's E=MC2 came from the question the nine-year-old boy genius asked himself. "What would happen if I could ride on a beam of light?" The result is nuclear energy.

Another great and simply brilliant idea is that everything has some kind of signature that can be measured. A new discipline called Measurement and Signatures Intelligence (MASINT) is evolving as a result.

"The use of MASINT starts with a problem solving approach to the question, 'what is the unique signature that will provide me the answer to an operational need?'" said COL Antoinette Smart, SMDC G2. "The thrust of Measurement and Signatures Intelligence is to detect and characterize intelligence and operations information based on identifying and 'fingerprinting' specific signatures of suspect activity."

This is the basic definition of Space forensics. "MASINT is performed across the electromagnetic spectrum," Smart added.

Brian Collins of the SMDC/ARSTRAT G2 explained that, "the vast majority of things, living things and inanimate things, have signatures. These may be in the spectral range in the way they reflect or absorb sunlight. They may be odors, such as CS gas used as a riot agent, or they can be the reliable decay rates of nuclear material being detected on a Geiger counter."

From this basic concept, a loosely knit science is developing.

"Today, scientists from a wide range of disciplines are coming together and defining the parameters for MASINT. This effort will continue until a library of measurable signatures for things are identified, mapped and made readily available to those government, scientific, educational and business interests that can use them. The field is constantly growing and evolving and revealing new types of information and new approaches to using it," Collins concluded.

Smart added, "MASINT has applications ranging from detecting disturbances in desert soil, based on changes in the manner in which infrared light is emitted, to detecting traces of explosive materials at airports, based on chemical and gas analysis. The value of this application of tech-

nology is that MASINT collectors can positively detect certain materials rather than circumstantial evidence of their presence, such as identifying the signature of an asphalt road rather than what looks like an asphalt road on a black and white image."

The development of this arcane branch of knowledge is not a new effort. The National Geospatial-Intelligence Agency website states that the first U.S. geospatial effort began in 1803 when President Thomas Jefferson sent the Army's Lewis and Clark Expedition to explore and map the recently acquired Louisiana Territory. The state of the art in this arena remained static until World War I when aerial photography became a major contributor to battlefield intelligence.

According to Robert "Bo" Dunaway, of the SMDC/ARSTRAT SORC, "This idea really cropped up during World War II when the Eastman Kodak Company began to develop film that would capture images in the infrared range."

Through this type of photography American forces were able to identify German camouflage nets—a simple capability with a far-reaching effect.

"From the visible, that is, to the human eye and normal film, those nets looked green, just like the foliage around them. However, in the infrared they had distinctly different characteristics. That difference was the reflection of the living foliage, filled with chlorophyll versus the reflection of the netting material that was inanimate. This gave our forces a huge tactical advantage," Dunaway said.

Carry this further. It is now 60 years later and our science and technology has grown by leaps and bounds. In the spectral arena, we have the ability to look from both airborne platforms and space and acquire huge amounts of highly diverse information. Because it is in digital form, it can be manipulated in a number of ways. This information is called geospatial intelligence, and MASINT is a large and important piece of this puzzle.

For instance, during the recent efforts by the U.S. Pacific Command to help the victims of the Asian tsunami, spectral imagery was able to assist the recovery efforts in several ways. The images of the post-tsunami areas in the Indonesian province of Banda Aceh showed the relief providers what the current situation on the ground actually was. This is the geospatial intelligence piece; however, using pre-tsunami images provided a whole other dimension of information.

LTC Richard Lewis is the Functional Area 40 (FA40), Space Operations officer on the Eighth U.S. Army staff in Korea. Eighth Army was the tip of the spear in providing direct space support to the operation.

"I was contacted shortly after the tsunami by the deputy G2 of Eighth U.S. Army to see if there was anything that we could provide to assist in planning efforts in support of the emerging relief effort." Lewis said. "The capabilities of the SORC immediately came to mind. Through a series of very timely emails and phone calls, even after hours in the States, I was able to explain the areas that we were planning for and the type of information we needed. The SORC quickly jumped onto the project and provided products in a very timely manner. The information was very helpful to our geospatial Soldiers in putting together the planning tools necessary for the units identified to deploy," Lewis added.

LTC Dennis Brozek, right, Space Support Element, 10th Mountain Division, discusses a satellite imagery product with SSG Joseph Szafranski, G3, 10th Mountain Division, during a recent command post exercise at Fort Drum, N.Y. (Photo courtesy of The Eagle)

Dunaway detailed the SORC efforts Lewis described.

"For tsunami relief we did a lot of change detection work, primarily assisting the relief agencies in capturing what impacts the tsunami had on select areas," he said.

Change detection involves taking a pre-tsunami image and overlaying a post-tsunami image on it and noting the differences. This kind of detective work allowed the relief providers to identify areas where roads were open or closed by tsunami damage, and to identify where villages had been, but were now destroyed or damaged in some way. The information also allowed the Eighth U.S. Army to focus its efforts, plan its movements and decide what could be done and what couldn't.

Detective work like this took the geospatial information available and reduced it to read the key signatures related to tsunami damage so the relief forces were able to focus their efforts accurately and effectively to relieve survivors.

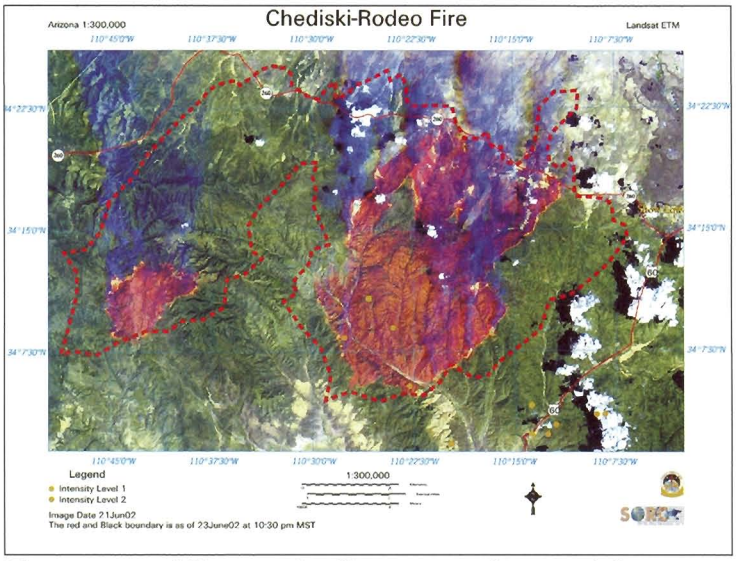
Dunaway has been a key player in the spectral imagery field at SMDC/ARSTRAT for about six years. In that time he has helped support a number of international and national efforts with the unique capabilities spectral analysis and MASINT can provide.

"The SORC has provided a lot of support to the National Interagency Fire Center, the U.S. Forest Service and others who fight fires," Dunaway said. "We get the requests for efforts within the U.S. through the U.S. Northern Command and pass them out through that same agency. We have provided fire imagery on several large fires in the past few years. Primarily we used the imagery to show where the fire had already traveled in the burned over areas. We were also looking for hot spots that the firefighters could then address to ensure there would not be any restarts in those areas. We also provided some predictive models of what the fire might do based on weather; how-

ever, fires are hard to predict because they make their own weather when they get large enough," Dunaway concluded.

Other efforts have included locating mass graves in the Balkans and Iraq based on the change detection model that discerns patterns of disturbed earth. The SORC is also capable of providing the information for the construction of digital fly-throughs that can help our forces rehearse missions well before they depart their U.S. bases. These fly-throughs give a commander an extremely accurate picture of what the terrain he will be operating over actually looks like. Additionally, he can take a look at the way a foe will see his unit by reversing the direction of movement on the fly-through. This kind of detective work can save time in rehearsal for short notice missions and can save lives during a conflict.

The SORC will soon be undergoing some upgrades to its current capabilities.



Measurement and Signatures Intelligence spectral imagery helps firefighters battling forest fire locate hot spots.

LTC Michael Childers, Deputy G2 at SMDC/ARSTRAT said, "The SORC will be getting some new capabilities to compliment the geospatial efforts they now provide. These upgrades will help to more accurately refine warfighter requirements. The better the tools we bring to the MASINT node, the better we can support the warfighter."

SMDC/ARSTRAT involvement in the geospatial intelligence and MASINT arenas goes back 15 years to the days in 1990 when the command, then known as the Army Space Command, ran the Army Space Exploitation and Demonstration Program (ASEDP).

The ASEDP staff demonstrated the advantages of the Portable, Lightweight, Global Positioning System (GPS) Receiver to the Army prior to Operation Desert Shield/Desert Storm, then acquired thousands of the units and trained the U.S. forces on its use when the call came from Saudi Arabia. One result of the use of the GPS was that the Battle of 32 Easting, was named, not for a hill or a town, but for GPS coordinates. The command also provided U.S. forces with satellite imagery maps of the area of operation. This was the first time that commercial satellite imagery played a key role in a real world operation.

"MASINT is now considered one of the most important intelligence sources for the future force," Smart said. "By removing uncertainty and enabling positive identification of materials and the effects of human actions, MASINT's true value will be in countering our adversaries' attempts to hide their true actions and intentions."

When asked how this new intelligence capability is affecting the way we fight, Smart answered, "MASINT is changing the way we view information. In the past we relied heavily on sources of information that we understand based on our current (physical) senses, imagery for example. Unfortunately, our adversaries understand the limitations of our senses and exploit these to conceal intentions and activities. As MASINT continues to provide more insight into what is actually occurring physically in the operational environment, Army forces are now making decisions based on the technical value of these sensors vice what they see. As a result we are reducing ambiguity in the decision cycle across the spectrum of operations."

Even the Presidential Commission on Weapons of Mass Destruction weighed in on the MASINT issue. They recommended the government should "reconsider MASINT." The commission believes that MASINT has been under-funded and under-utilized in the governmet Their recommendations include setting up a special office to investigate, develop and adapt MASINT technologies for future use.

Finally, while most examples of CSI Space are classified, Childers described some really good detective work done by former Air Force MSG Rich Burch. Now a civilian employed by the SORC, Burch's story illustrates the relationship between geospatial intelligence and MASINT.

When mass graves are dug, the gypsum is turned over...leaving a signature.

During his tour in Iraq, Burch used a known mass gravesite to gather spectral data that he could use to compare to about 240 other possible gravesites throughout the desert portion of the country. Burch located at least one site based on the presence of gypsum. Gypsum is a sub soil in the dry, desert regions of Iraq. When mass graves are dug, the gypsum is turned over and winds up on top of the earth, thereby leaving a signature. One mass grave Burch located was a mere 20 feet by 50 feet, about the size of a home garden. This garden yielded 300 corpses.

His real life work provided closure to the families of those people, just like the *CSI: Miami* team provides closure to the families of the victims in their stories.

"This is CSI: Space," Childers said.

INTERCEPT POINT *Continued from Page 3*

location. However, its "transponded" nature and finite resources require close coordination between the ground and control segments of the system to maximize assets available to all users.

The 1st Space Battalion was activated on 15 December 1999. This activation signified an important commitment by the Army to fully embrace space operations as an Army core competency. The 1st Space Battalion was formed to care for the Soldiers and to provide an operational headquarters for command and control of Army space forces. The battalion's original mission was to provide existing and emerging space support to U.S. forces and to provide in-theater tactical ballistic missile warning. The battalion's mission was accomplished through the 1st Space Company (Theater Missile Warning, i.e. JTAGS), the 2nd Space Company (Army Space Support Company) and Headquarters Company. The 1st Space Battalion's mission expanded to include conducting space control operations in support of U.S. Strategic Command (STRATCOM) and the combatant commanders with the addition of the 3rd Space Company in October 2001.

The 1st Space Company provides early warning of missile launches with forward deployed units in several theaters. The 2nd Space Company provides space support to the combatant commanders via embedded Army space support teams. The 3rd Space Company is currently involved in testing and evaluation missions that have enabled each of the armed services to refine products being developed for warfighters worldwide. The 3rd Space Company also served an 18-month deployment to Oman in support of both Operation Enduring Freedom and Operation Iraqi Freedom.

Satellite imagery reveals extensive flooding in the streets of New Orleans resulting from Hurricane Katrina.

The 193rd Space Battalion is a Colorado ARNG unit assigned to SMDC/ARSTRAT. The unit was activated just after 11 September 2001 and has had a very active existence since its inception. Members of the unit are currently deployed to Bahrain, operating the Commercial Exploitation Team capability. Commercial exploitation involves the rapid delivery and analysis of commercial space imagery to users in theater.

The 193rd is composed of a space support company, a space control company and a headquarters element. The creation of the 193rd Colorado ARNG Space Battalion is another milestone toward integrating space operations into the Army's warfighting capabilities by including the National Guard as a part of today's space forces.

Since the fall of 2001, active duty Soldiers of the 1st Space Battalion and mobilized members of the 193rd have been providing space support to the global war on terrorism. This support includes teams deployed in theater as well as support from elements located in the United States. This support has given our forces vital information and intelligence used in supporting combat missions, reconstruction efforts and even the location and excavation of mass graves.

In October 2003, the Army activated its first missile defense brigade. The 100th Missile Defense Brigade (GMD) is headquartered in Colorado Springs and staffed by Colorado ARNG and active component Soldiers. The brigade provides expertise to U.S. Northern Command's command and control operations from the Cheyenne Mountain Operations Center, as well as oversight and direction to its Alaska-based battalion.

In 2004, the Army activated the 49th Missile Defense Battalion (GMD) at Fort Greely, Alaska. The battalion provides operational control over ground-based interceptors, and is manned by Alaska ARNG Soldiers. When the system becomes operational in late 2005, it will provide, in concert with sister services and other organizations, the foundation of the nation's missile defense strategy.

The Army Astronaut Detachment supports our nation's human space flight program. The detachment is composed of six Army astronauts and an administrative specialist. The detachment is resident at National Aeronautics and Space Administration's Johnson Space Center in Houston, Texas. All of the Army astronauts are qualified both as space shuttle mission specialists and as space station crew members, providing operational support to ongoing space missions.

The FWC is the Army integrator and proponent for space and missile defense mission areas. The FWC identifies, develops and rapidly transitions concepts and innovations that enhance Army and joint warfighting capabilities.

The FWC has operations in Huntsville, Ala., Colorado Springs, Colo., and Arlington, Va. The Colorado Springs node includes the Space and Missile Defense Battle Lab, which develops and validates concepts leading to doctrine, operations, training, materiel, leadership development, personnel, and facilities alternatives and solutions. The battle lab conducts and evaluates experiments and war games, develops prototypes, tools, hardware, and future operational concepts and capabilities. Lastly, the battle lab delivers innovations that have moved through the evaluation process to the warfighter.

Another portion of the FWC with a facility in Colorado Springs is the Directorate of Combat Development. This directorate provides integrated force development and generations of capabilities documents for materiel solutions to warfighter problems. It's also responsible for designing training; development concepts, assessments and evaluations; education and doctrinal tactics, techniques and procedures; and training of personnel to perform mission area functions.

The TSM for Ground-based Midcourse Defense is the centralized manager and integrator of joint doctrine, organization, training, materiel, leader development, personnel and facilities products and is the single user representative to the GMD materiel developer. The TSM's goal is to develop consensus and promote teamwork while leveraging TRADOC and SMDC force development resources for the fielding of GMD and integration with the Ballistic Missile Defense System.

The TSM assigned to SMDC reports to the TRADOC commanding general through the commander of SMDC. The TSM acts on behalf of the Army and joint warfighter community, including the ARNG, STRATCOM, U.S. Northern Command, U.S. Air Force Space Command and all subordinate user organizations in the GMD program.

In January 2005, LTG Larry J. Dodgen was named commander of Joint Functional Component Command for Integrated Missile Defense (JFCC-IMD) by GEN James Cartwright, the STRATCOM commanding general. The JFCC-IMD is a subordinate component of STRATCOM for IMD. The JFCC-IMD mission is to plan, coordinate, integrate and globally synchronize missile defense systems and operations to provide an optimized, layered missile defense against missiles of all ranges and in all phases of flight. During hostilities they will work to enhance the capabilities of Army air and missile defense commands in theater.

The JFCC-IMD is being established on Schriever Air Force Base, Colo., allowing the command to leverage the existing, extremely robust infrastructure on the base and the strong partnership with the Missile Defense Agency to execute IMD planning and operational support responsibilities. This new joint command will be manned by members from all the services, government civilians and contractor personnel.

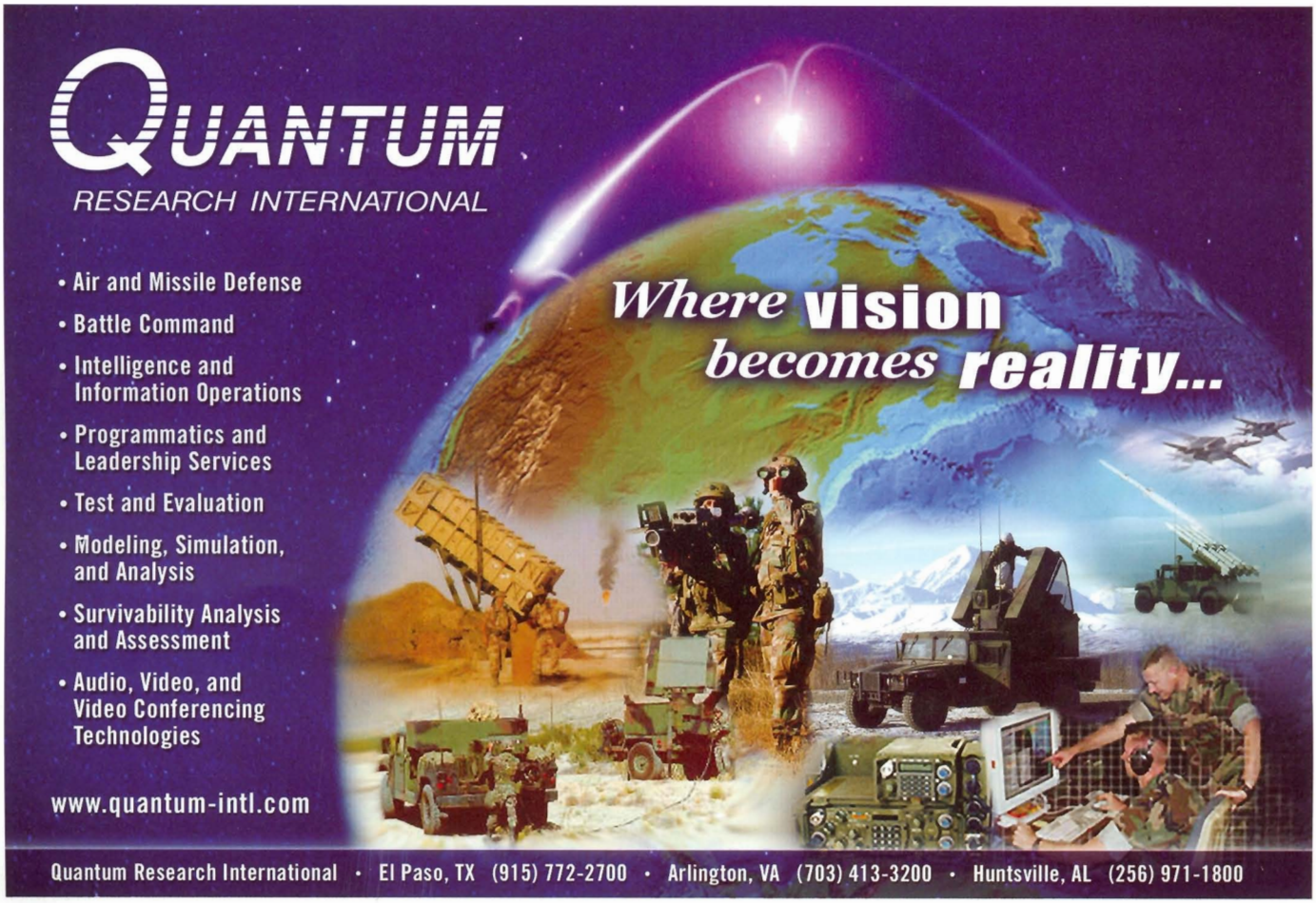
...space support of the force continues to protect our deployed Soldiers and our homeland.

The Army's involvement in space operations goes back to the 1940s and it continues today to support our forces engaged in combat, peacekeeping and warfighting exercises around the globe. From the development of the Redstone Rocket to the use of satellites orbiting 2,300 miles in space, the Army's commitment to, involvement with and contributions to space support of the force continues to protect our deployed Soldiers and our homeland.

Robert P. Lennox

Robert P. Lennox
BG, USA
Commanding

BG Robert P. Lennox is the Chief of Air Defense Artillery, Commandant of the U.S. Army Air Defense Artillery School, and Commanding General, U.S. Army Air Defense Artillery Center and Fort Bliss, Texas.



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