Army Space Journal
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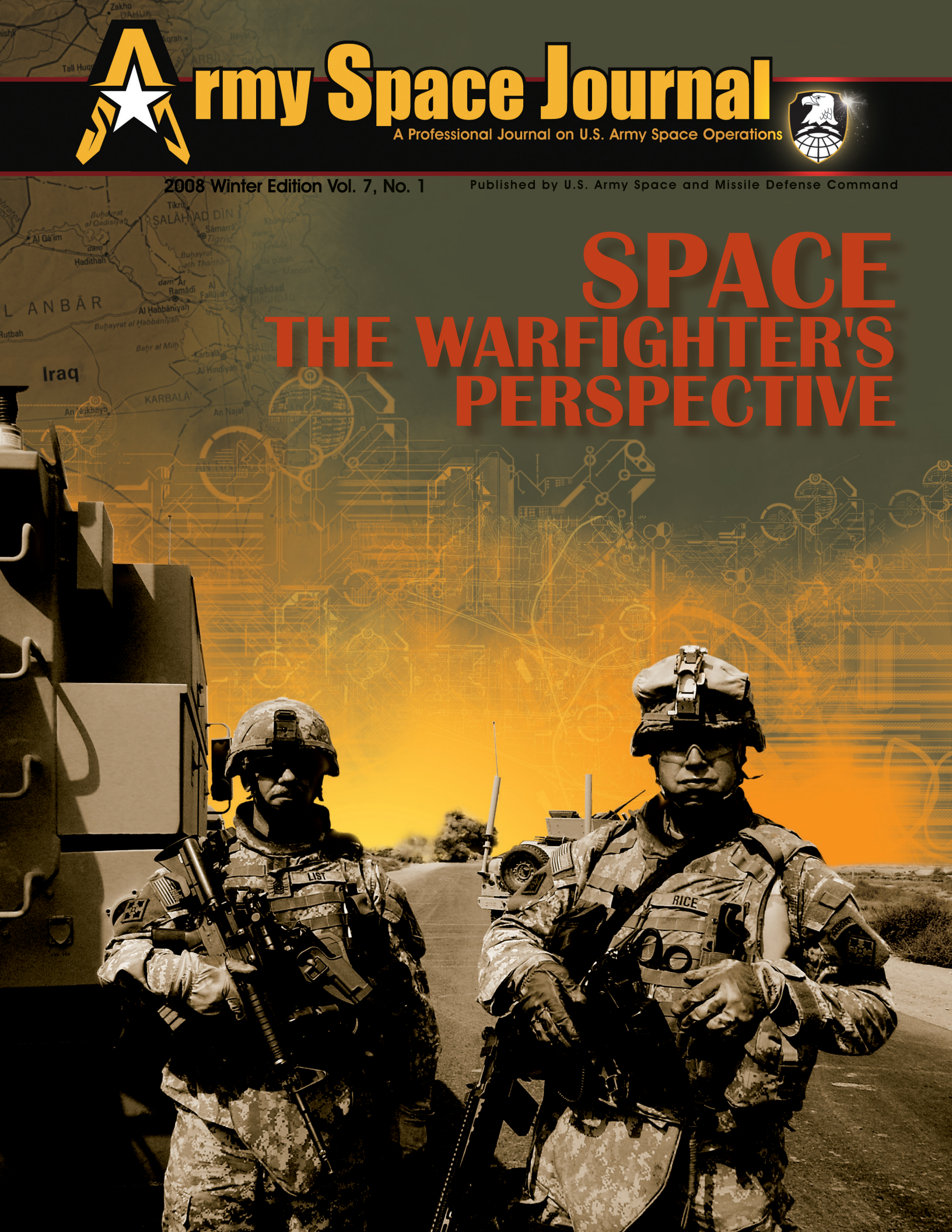
SPACE
THE WARFIGHTER'S PERSPECTIVE



Army Space Journal

The U.S. Army Space and Missile Defense Command publishes **the Army Space Journal** quarterly, with special editions as required. The publication consists of four sections, FROM THE TOP — Leadership Updates; JOURNAL FORUM — Space Topics; TIP OF THE SPHERE — Space Cadre News/Features; and FLIPSIDE — SMDC Features.
The Journal provides a forum through which Space operations professionals can disseminate professional knowledge and furnish information within the U.S. Army. The purpose is to increase the effectiveness of Space operations through a professional discussion of events and lessons learned. It is also intended to inform the Army warfighter on Army Space issues.

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The views and opinions expressed in the Army Space Journal are not necessarily those of the Department of the Army or U.S. Army Space and Missile Defense Command.

From The Top

Leadership Updates

50 Years in Space 4
By LTG Kevin T. Campbell
50 years ago, the Army launched America into Space by successfully placing the Explorer I satellite into orbit. Since then, the Army has been utilizing Space capabilities to provide Space Support to Army Operations. This support is identified through five Space Force Enhancement Areas: communications; position, velocity and timing; environmental monitoring (Space and terrestrial weather); intelligence, surveillance, and reconnaissance; and theater missile warning. In his column, Campbell touches on each of these areas and the growing cadre of Space Professionals that are being specifically trained to assist in bringing these Space-based capabilities to the warfighter.

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Cover Photo: Courtesy of Fort Carson
Back Cover Photo: By Sharon L. Hartman
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Editor's Blog

Would Ike blog? Or Patton? I think they would've seen blogging as one way to keep the American public informed about our critical national security efforts. If this task was complicated during their day, it is even more so now. Today's information world is nuts. There is a tremendous amount of information banging our heads daily, minute-by-minute in today's environment. So Americans need credible information from our military leaders to ground all the other stuff they hear in the news and by word-of-mouth.

Why should members of our military community blog? It adds raw energy to the conversation. I guess I'm an old fashioned writer. I like to handwrite my thoughts, rewriting and rethinking them many times before they are finally typed and published. A blog, though, tends to be much more immediate, dynamic and broad. It's a bit of a free-flow of key points from one person to many that contribute to a conversation in the cyber world, a conversation that anyone with internet access can join. You simply key in the words of what you think about a topic into the computer - be careful, though, because your thoughts are published to the world once you hit enter.

So what's a blog doing in the print version of the Army Space Journal? I found the answer talking to retired COL Ronan Ellis as we planned to induct him as our fourth pioneer into the SMDC/ARSTRAT operational hub in Colorado Springs, Colo. "It was an amazing time. We were on the offense to get Space into the Army ... . We had to personally go to GEN Colin Powell to get the keys to the kingdom (in order to use Space sensors for theater early missile warning)." You get the same feeling when you consider other pioneers we've inducted over the last couple of years. Ellis was the second commander of Army Space Command during the first gulf war — responsible for getting Global Positioning Satellite data to the ground forces (along with other Space-based capabilities).

It's this spirit in the Space arena that the ASJ is all about demonstrating. Consider the other pioneers. The first, MG John Medaris, was responsible for getting America's first satellite into Space in 1958. LTG CJ Le Van was responsible for missile defense development since WWII and into the 1970s. BG Robert Stewart was our first Army astronaut. I imagine it took a good deal of boldness, heart and stick-to-it nerve for these four men — and many others like them — to

Note: An Article in the 2007 Special Edition was mistakenly attributed to LTC Thomas James as the author. The article is a product of ASJ staff. We regret the error.

make these things happen. And, in today's world of political correctness, it takes at least a small degree of the same characteristics to fearlessly speak up in a public forum like, in this case, a blog.

Because we like the rawness and energy we find in blogs, then why not use that shot in the arm to help energize the pioneer approach today? Our goal as we enter the ASJ's seventh year is to grow into a bigger part of the conversation about what the Army is doing in Space.

Here's our first entry. It's from retired COL Glen Collins: "I just finished reading the Summer 2007 (VOL. 6 NO. 3) ASJ. Ok ... I'm a slow reader and it took me a while to finish ... . The ASJ also is truly meeting its original intent of serving as a forum where concepts are shared, and doctrine formed. MAJ (Patrick) O'Brien's article on SMDC's "Position on Space" was just right in letting others know about the important debates on JP3-14, and asking for inputs from the readership. I was involved in the writing of the original JP3-14, and know how critical it is to the Army to get this document right. It appears the DCD has their eye on the ball. The discussions on SSE vs. ARSST are also right on the mark. The issues are what I told ARSTRAT back in 2002, and the Army Space leadership has brought SSE and ARSST to success. I was also very impressed with the article on the future of our Army Space Forces written by LTC Tom James, LTC Jim Rozzi, and LTC Bob Guerriero. They have accurately framed the issues for discussion, and in my opinion are almost exactly on the mark. My compliments to all involved in producing the ASJ. I look forward to the next edition ... ."

This means you are now invited to participate in the conversation on space. Please e-mail your thoughts to michael.howard@smdc-cs.army.mil about the various topics you find in this edition. I will include them in my blog in the next quarter's ASJ. I am waiting to hear from you.

Mike Howard
Editor-in-chief

BG Stewart

Col Ellis

MG Medaris

LTG Le Van

LTG Kevin T. Campbell
Commanding General,
U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command

50 YEARS IN SPACE

By LTG Kevin T. Campbell

On Oct. 3, 1957, the Army created the Redstone Anti-Missile Missile Systems Office in Huntsville, Ala., to begin research that would lead to development of the NIKE-ZEUS anti-missile system. This date marks the beginning of today's Space and Missile Defense Command which is celebrating 50 years as the Army's lead for all Space and missile defense actions. This date also happens to be the eve of man's first Space milestone; the successful orbiting of a manmade satellite. Russia's launch of the Sputnik satellite on Oct. 4, 1957, heralded the beginning of the Space race, and the beginning of 50 years of very rapid advancement in Space technologies. Who would have believed that this 184-pound basketball-size satellite, circling at a maximum of 560 miles above the earth, at a speed of 18,000 miles an hour, would someday give birth to today's Space capabilities.

Launch of Freedom 7, the first American manned Space flight on the Mercury-Redstone (MR-3) rocket
Credit: NASA

During the past 50 years, America has experienced all of man's triumphs and tragedies in Space. Some of you may remember December 1958, when President Dwight D. Eisenhower sent his Christmas greeting to the world from the Army's Project SCORE (Signal Communication by Orbiting Relay Equipment); the world's first communications satellite. Many of you may also remember when Americans were extremely anxious after a Soviet astronaut named Yuri Gagarin became the first man in Space on April 12, 1961, and intensely proud when 23 days later, Commander Alan Shepard became the first American in Space; placed there, by the way, on an Army Redstone developed rocket

Our nation experienced great sorrow, when America suffered her first Space casualties on Jan. 27, 1967. That is when Astronauts Gus Grissom, Ed White and Roger Chaffee tragically lost their lives after a flash fire broke out in the first Apollo Command Module during a launch pad test at Launch Complex 34. Their deaths led to a redesign of the Apollo Capsule, and the successful completion of a program that safely landed the first men on the moon.

There were to be many more triumphs and failures during the decades of Space exploration leading up to today. Some would remind us just how very dangerous Space travel can be, and others would forever change our view of the world and how we interact on a global scale. Space is the reason we now have instantaneous global communications as well as the ability to carry out rapid, global, financial transactions. Because of Space, we can easily navigate to any given point on the earth and we can obtain high resolution maps of our destination when we want them. Weather forecasts are much more accurate, and we have the ability to

identify and track major weather events.

From the perspective of the United States Army, Space exploration and commercialization has profoundly impacted day-to-day combat operations and has totally changed the face of modern warfare. The Army is no longer a static, forward deployed force, operating from legacy war plans. Instead, the Army has transformed to a modular force, capable of placing maximum fire power upon a given objective with minimal notice. Successful deployment of multiple unit configurations, into unfamiliar areas, and often in support of Joint and/or multinational operations, demands the effective use of all available Space Force Enhancement. Army Field Manual 3-14, Space Support to Army Operations, identifies five Space Force Enhancement areas.

- Communications;
- Position, velocity and timing;
- Environmental monitoring (Space and terrestrial weather);
- Intelligence, surveillance, and reconnaissance; and
- Theater missile warning.

Space Force Enhancement assures the Army's ability to deploy its warfighting capability to any location in the world. They allow our troops to maintain full situational awareness of their position, the position of friendly forces, terrain information, current and projected weather conditions, enemy troop locations and capabilities. Space Force Enhancements also give our troops the ability to effectively communicate with other warfighters within their area of operation, and to reachback to rear support capabilities, including the United States.

U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT) is responsible for assuring all Army forces have access to these Space Force Enhancement capabilities in order to accomplish their assigned missions.

Our vision is *"to provide dominant Space and missile defense capabilities for the Army; to plan for and integrate those capabilities in support of U.S. Strategic Command (USSTRATCOM) and the Geographic Combatant Commanders' missions." This vision is implemented under SMDC/ARSTRAT's Mission: "SMDC/ARSTRAT conducts Space and missile defense operations and provides planning, integration, control and coordination of Army forces and capabilities in support of USSTRATCOM missions; serves as proponent for Space and ground-based midcourse defense; is the Army operational integrator for global missile defense; conducts mission related research, development and acquisition in support of Army Title 10 responsibilities and serves as the focal point for desired characteristics and capabilities in support of USSTRATCOM missions."*

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BG John E. Seward

Deputy Commanding General for Operations
U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command

"Technology & the Customer"

As I begin my tour of duty with the Army's proponent for Space and Integrated Missile Defense, I want to share with you my thoughts and philosophy on technology and how the Army uses it.

Newt Gingrich spoke at a course I recently attended. He quoted the chairman of the National Academy of Sciences' working group as saying that "we'll have between four to seven times as much science in the next 25 years as we got in the last 25 years." If it is four times as much, that is like sitting in 1880 and trying to describe what life would be like in 2007. Just imagine trying to describe the future then.

Think about it. Gingrich went on to say, "In 1880 they had just invented the internal combustion engine in Germany. There were no cars built yet anywhere in the world. The telephone was only three to four years old. Very few people had one. The idea that you would drive a car to get into an airplane, which had not been invented, to use your cell phone or your Blackberry while waiting for the door to close when they turn on the movie which had not been invented … I mean, just think about this scale of change. And yet, if we're right, and there's going to be four times as much science, the change will be about the same as from 1880 to today.

"But let's assume it's seven times a much. Then you're back to Sir Isaac Newton in 1660, inventing calculus."

That is a lot of technology coming on-line in the next 25 years that may have a military application.

I love history and use it to learn lessons and draw inspiration. I look at our Army's flag with its 178 streamers recounting 232 years of the Army serving its Nation, doing what its Nation asked it to do. The Army did it then; it does it today; and it will serve strongly tomorrow. As we think about our Army's legacy from Lexington to Iraq, the challenge I pose to you is to ask Soldiers and commanders what they need today, and what they will need tomorrow to more successfully prosecute their mission. I also challenge you to not discard ideas and concepts because they don't fit in the "box" of current thought.

I'd like to start with a few stories to illustrate my last point. Although all these illustrations are air defense specific, the moral of the stories applies across the board.

When I was in the Officer's Advanced Course, I listened to one of our Air defense Artillery senior leader's state, "GUNS ARE DEAD! We are leaving Vulcans, etc, behind and investing all in Patriot." You may remember that the Vulcan is a towed or self-propelled anti-air defense weapon that fires a Gatling-style cannon with an extremely high rate of fire.

Patriot is a great system, but having served in Iraq, I can tell you that a few Vulcans on the perimeter would be very welcomed. Now, I'm not advocating bringing back the Vulcans, and who could have known what lay ahead when a short-sighted view of "GUNS ARE DEAD!" was adopted?

Several years ago I saw another Air Defense Artillery officer brief some innovative changes to the Avenger which replaced the Vulcan and Chaparral. The Avenger has two Stinger missile launcher pods, each capable of firing up to four fire-and-forget guided missiles in rapid succession. This officer proposed changing one of the pods for a 2.75 MM rocket pod and adding a more robust, Vulcan-like machine gun to the system. This officer was ridiculed and just about laughed out of the room. Just think if we had that system today in Iraq. The ground maneuver commander would have the Avenger systems in every perimeter. Although providing perimeter and convoy defense is not necessarily an air defense mission, an Avenger so outfitted would provide great value to the current fight.

My third little story comes from a few months after the Sept. 11 attack. I was at a conference on the future of divisional Man-Portable Air Defense (MANPAD) systems. Soldiers can carry this system and fire its missile from their shoulders. The theme of the conference planners was "MANPAD is DEAD!" An officer brought up that a MANPAD gunner operating in a city could help defend against a Sept. 11-type attack. The group leader said, "If I can ring the city with longer range systems, I wouldn't have to have a short-range MANPAD system." The officer countered that if we could develop a MANPAD that could fire 20-30 kilometers, beyond-visual-range, we could do the same job with just one gunner. Everyone looked at the officer like he was crazy and the final conclusion of the day continued to be "MANPAD IS DEAD!"

In those three instances, the decisions seemed to be already made so the officers asking the "what if" questions or proposing different solutions were discounted. So the questions are: who is looking at the "what ifs?" and where are the visionaries of "what could be?"

Every organization has them, but many times they are dismissed or marginalized by the bureaucracy of our acquisition process, by the lack of money, or because we're protecting our turf. Most of us — the Services and industry — aren't willing to take much risk on a "could be" program or system. Let me tell you about a success of one who asked, "what if?" and found an innovative way to use what the military already had.

Earlier in Operation Iraqi Freedom, a lot of U.S. military deaths were coming from rocket, artillery and mortar attacks. In 2004, the Multinational Corps-Iraq asked for help to solve that problem. They needed something that could engage those weapon systems and they needed it right then. So someone asked, "what if — what if we use a weapon we already have?" So they tried several systems, held a shoot-off and chose the Phalanx, an existing Navy anti-ship missile defense system. Out of

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COL Bruce Smith
Director
Space and Missile Defense
Future Warfare Center

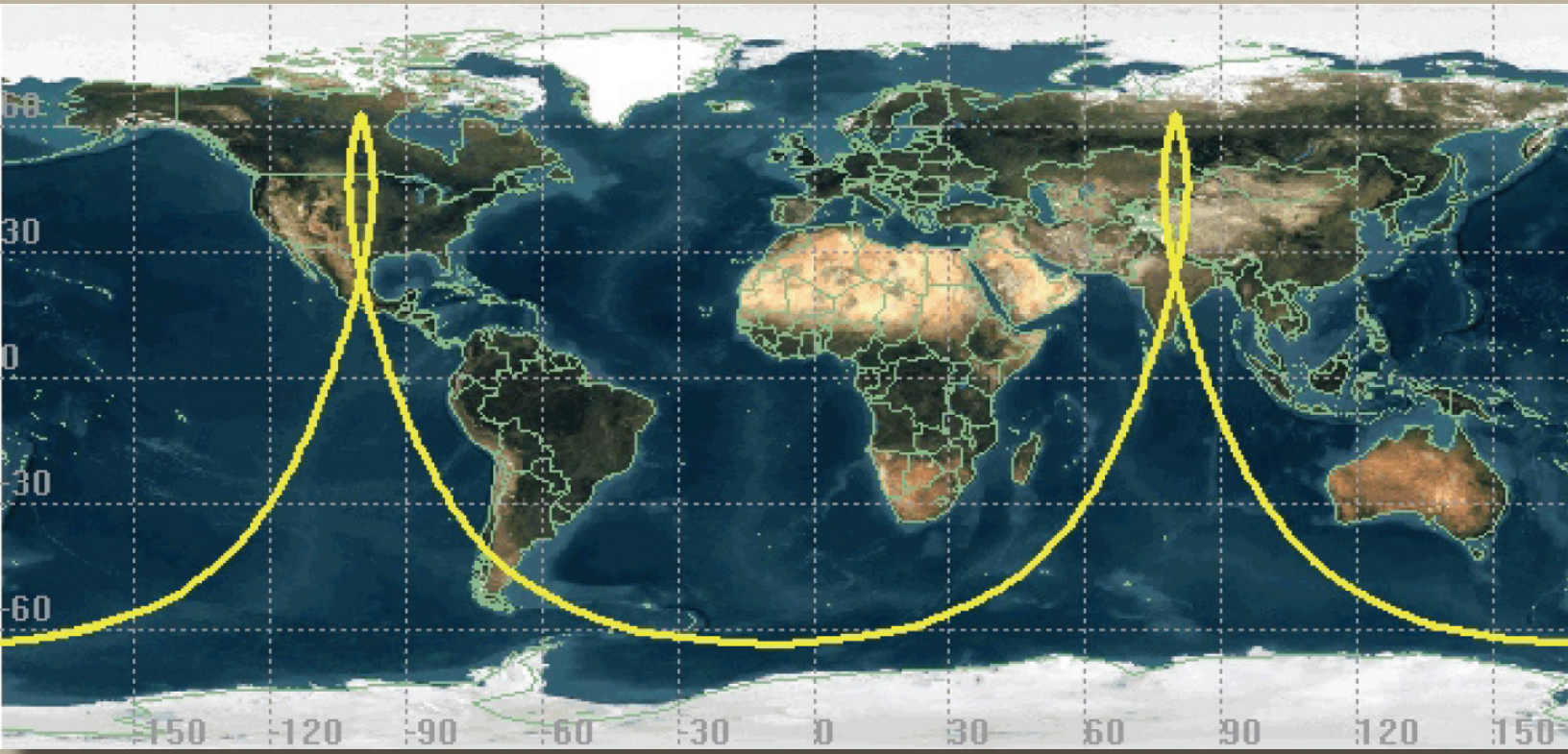
Theater Missile Warning

How it started ... Where it's going

Army Theater Missile Warning was given a jump start on February 25, 1991 when an Iraqi SCUD missile destroyed a barracks housing members of the 14th Quartermaster Detachment in Al Khobar, Saudi Arabia. In the single, most devastating attack on U.S. forces during Desert Storm, 29 Soldiers died and 99 were wounded. This very incident solidified for then Vice-Chief of Staff of the Army, GEN Dennis Reimer, the realization that satellite information on missile launches would be extremely valuable for both Missile Warning and Missile Defense if processed in the theater and communicated immediately. Subsequently, Reimer directed the quick development of the Joint Tactical Ground Station (JTAGS) as the important first step to achieving this goal. Amazingly, JTAGS cost only $30 million and was just four short years in development. Today, JTAGS continues to provide theater missile warning to commands around the globe and is a proven asset.

Like any critical technology, Theater Missile Warning systems must be continually upgraded to improve system performance, provide additional capability, and to address new threats. U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, in coordination with the JTAGS program office, has developed plans to upgrade JTAGS as well as define and develop modernized Theater Missile Warning capabilities. When implemented, this plan will ensure the Army's contribution to Theater Missile Warning and Missile Defense is upgraded to yoke the synergies of net-centricity, improve Combatant Commander's situational awareness, provide enhanced force protection and integrate with new Space systems.

A key capability in JTAGS modernization is the inclusion of signals from the Space Based Infrared System - Highly Elliptical Orbit satellites. This modernization of Space-based missile warning satellite systems has begun and the first Highly Elliptical Orbit satellite is on orbit. This has prompted the first near-term modernization requirement: a modification of the JTAGS system to accept signals from the new satellites. Since these Highly Elliptical Orbit birds do not stay over one spot on Earth, a satellite dish receiver must lock onto and track the satellite to receive continuous download. This is called Auto Track Transfer functionality. This capability will be delivered by leveraging Missile Defense Agency funded Auto Track Transfer server development efforts. Space Based Infrared System - Highly Elliptical Orbit data will be provided to the fielded JTAGS from the continental United States via the current Tactical Dissemination and Reporting landlines. Furthermore, this effort will serve as a pathfinder for



ABOVE: Figure 1. Highly Elliptical Orbit Ground Track

SBIRS Geostationary Direct Downlink processing given the Highly Elliptical Orbit sensor commonality with the Geostationary scanner. We can expect that operationally relevant Auto Track Transfer (not man-in-the-loop) Space Based Infrared System - Highly Elliptical Orbit track data will be available for JTAGS processing in the Fiscal Year 2008 time frame.

After Space Based Infrared System - Highly Elliptical Orbit data processing capabilities are established, Space Based Infrared System - Geostationary Direct Downlink will be incorporated in two phases. The initial capability will use only the scanning sensor data from the Space Based Infrared System - Geostationary satellite and is scheduled to be fielded circa Fiscal Year 2010. This augments the current Defense Support Program processing and provides an evolutionary increase in capability from the next generation satellites. The final capability will add the Geostationary starting sensor processing circa Fiscal Year 2012. This will provide a revolutionary increase in performance in all mission areas because of faster revisit rates and greater sensor sensitivity. This capability will greatly enhance documented theater requirements.

Concurrent with this growing capability will be an initiative to dismount the JTAGS from the current mobile shelters. JTAGS will be able to be converted from five deployable systems to four in-theater, relocatable systems at fixed sites and one training system. Four will remain operationally employed with one in strategic reserve that will also support Initial Qualification Training.

There is also a vision for the far-term modernization of theater missile warning. The vision end state is to have net-centric Theater Ballistic Missile Warning that is integrated with Theater Missile Defense, to include sensor cueing that will support the characterization of the operational environment. This is to be achieved with upgraded processors running advanced Overhead Non-imaging Infrared algorithms that process the new Space Based Infrared System scanning and staring data. The Army's goal is to improve the effectiveness of Theater Missile Waning using a combination of netted sensors and processors while simultaneously reducing manpower and operational costs. SMDC/ARSTRAT is working to define the requirements and technologies needed to build and employ this netted system.

The upgrades to JTAGS discussed here is just the visible portion of an iceberg as far as growing capabilities in Army Space. The Future Warfare Center is pursuing development of improved, as well as new, Space and Global missile defense capabilities, which could eventually include Operationally Responsive Space and High Altitude as well. New doctrine, new organizations, and new technologies are increasing the Army's need for Space capabilities and making it possible to meet those needs. JTAGS was just the beginning; SMDC/ARSTRAT will continue to bring enhanced warfighting capability to the ground warfighter through advanced Space and Ground-based Missile Defense applications.

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Space Support to the Warfighter

The Army is leveraging Space-based capabilities in support of the Joint warfighter in many ways, including the use of other Space professionals and experts in addition to Space Operations Officers. Examples include the Army Space Support Teams (ARSSTs) who rapidly deploy worldwide to deliver Space capabilities, services, and expertise in support of ground forces to include numbered Armies, Corps, Special Forces, Marine Expeditionary Forces (MEF) and Joint Task Forces during exercises and contingency operations. Team members serve as Space subject matter experts across the supported unit's staff. Their mission focus is Space force enhancement operations. At present, there are six Active Duty and four Army Reserve teams activated under the 1st Space Battalion, 2nd Space Company with an additional 11 teams forming under the Colorado Army National Guard. The end state for the ARSST force structure is 27 teams across the Active, Reserve and National Guard structures.

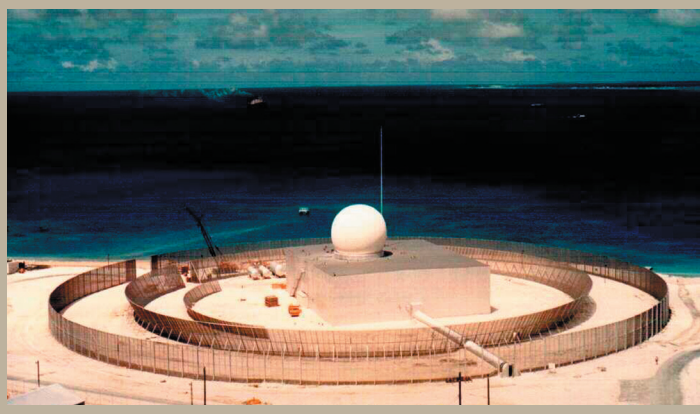
The Joint Tactical Ground Station (JTAGS) is the Army's primary system for providing integrated, in-theater, 24-hour overhead non-imaging infrared detection capability for processing and disseminating ballistic missile early warning and alerting data to combatant commanders and missile defense assets. By processing direct down-linked infrared data, JTAGS provides timely notification of ballistic missile launches to theater forces. The Army's JTAGS provides assured missile warning to the combatant commander. The follow-on JTAGS capability will provide an expanded in-theater capability as the hardware and software are upgraded to support new satellite constellations. Ballistic missile early warning capabilities will be enhanced significantly in the coming years as the Space-Based Infrared System High Satellites and Space Tracking and Surveillance Systems are launched and achieve operational capability.

Commercial Exploitation Teams (CETs) provide the capability to receive, exploit, and disseminate commercial satellite imagery products to Space elements, warfighters and coalition elements in the supported combatant commander's area of operations. Commercial Exploitation Teams work in collaboration with National Geospatial-Intelligence Agency (NGA) Support Teams, the topographic community and collection managers — the Commercial Exploitation Team brings the "warfighter" perspective. Currently the Central Command theater Commercial Exploitation Team provides invaluable support to the combatant commanders and our international partners, by obtaining timely imagery from commercial vendors in support of those who can make a difference. These commercial images are key to sharing information with the Iraqi government, enabling it to assume a greater role in Iraq's security, and to support the thousands of others working to stabilize the country and build its infrastructure.

Space-based capabilities provide or facilitate the exchange of vital information required to support and sustain multinational and coalition operations. These complementary and reinforcing effects minimize vulnerabilities and enable the delivery of combat power greater than the sum of individual parts.

The Army's Space Cadre

In 1998, the Army recognized the need for a cadre of Space Professionals who were specifically trained in and knowledgeable of Space-based capabilities and their employment in support of the Warfighter. This was actually several years ahead of the 2001 tasking by former Secretary of Defense Donald H. Rumsfeld to develop and maintain a cadre of Space-qualified professionals. The Army established the Space operations functional area designated FA40 "Space Operations" in order to identify and manage its Space Professionals. Career specialists whose principal duties include planning, developing, resourcing, acquiring, integrating or operating Space forces, concepts, applications, or capabilities in accordance with Department of Defense Directive 3100.1 and Joint



Part of the 1950 NIKE-Zeus project, the Zeus Acquisition Radar (ZAR), the first track-while-scan radar, was but one element of this intricate network of seven radars and the ZEUS interceptor. **Courtesy photo**

Publication 3-14. These Space Operations Officers/ Functional Area 40 (FA40) Officers form the core of the Army Space Cadre. This relatively small (less than 200 officers) but significant population is focused on integrating Space Force Enhancement into Army-wide operational and strategic planning.

In 2005, the Army Space Council approved the formation of the Space Cadre Office and cadre definitions for use in identifying Space Professionals as well as Space Enablers; those personnel assigned to positions whose primary career field is not Space, but perform unique tasks or functions or may require skills to apply Space capabilities. Armed with cadre definitions, the Army used FORMAL, a capstone Army Force Management Analysis tool, to look both horizontally and vertically across the Army in order to identify the Army's Space Enablers. The Army identified more than 1,700 Space Enabler positions that are being filled with civilians, non-FA40 Officers, Warrant Officers and Enlisted Soldiers. In January 2006, the Vice Chief of Staff Army agreed with the Army Space Council way ahead and directed SMDC to "continue to manage the program."

Coordinating the objectives and efforts of our Space Professionals and our Space Enablers (the Army's Space Cadre) in order to maximize the Army's Space and Integrated Missile Defense support to the warfighter is one of SMDC/ARSTRAT's highest priorities. In order to continue to successfully influence the development of Space and Integrated Missile Defense initiatives, the Army must make efficient and effective use of its Space Cadre.

Army Space Operations Officers have been serving in Joint Space locations since inauguration of the functional area in 1998. The initial authorized structure listed 50-plus Joint positions within what were then the U.S. Space Command, North American Aerospace Defense Command and the National Security Space Architect Office. This number has grown with the evolution of these commands into the U.S. Strategic Command and National Security Space Office.

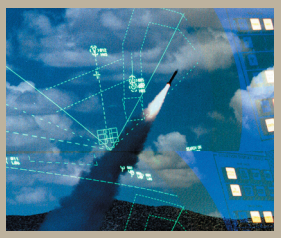
A concentrated effort began in 2006 to identify Army and Joint locations still lacking Army Space expertise and to determine the best way to expand the presence of FA40s in these key command locations. As a direct result, Army Space Operations Officers have been placed in the Air Force Space and Missile Systems Center, the Joint Functional Component Command for Space (JFCC Space) and Space and Naval Warfare Systems Center. The Army has also placed Space Operations Officers with Office of the Secretary of Defense, Defense System Information Agency, National Reconnaissance Office Army Coordination Team, Defense Advanced Research Projects Agency and numerous Combatant Commands. Future Army efforts will focus on expanding the presence of Army Cadre (both Space Professionals and Space Enablers) at these locations and throughout the National Security Space Community.

To assure standardized training of Space Professionals, the Army uses portions of the Air Force Space curriculum in the 11-week long Army Space Operations Officer Qualification Course managed by SMDC's Future Warfare Center. Air Force Space Command's National Security Space Institute Space 200 course focusing on the concepts of Orbital Mechanics, Acquisition, Space Law, Policy and Doctrine, and the integration of Space effects into the Joint fight, constitutes the first four weeks of the Army's course. Recently, Army Space Operations Officers, many who are combat veterans, have been added to the National Security Space instructor staff. The result is a stronger Joint perspective on Space education which benefits all services who attend the National Security Space Institute. In concert with the Air Force's Institute of Technology, an effort is currently underway to establish a graduate degree program and to assign an Army Space Operations Officer to its staff.

The Army's Space Master Plan

The Army's effort to assure standardized training of Army Space Professionals transcends its close relationship with Air Force Space Professionals. Army Space Operations Officers have graduated from the Naval Postgraduate School since 1999 and keep providing timely and relevant input to the school's Space curriculum. In recognition of the Army's standardization of Space Cadre training, Air Force Space Command recently authorized the wearing of the Air Force Space Badge by qualified Army personnel.

Space-based capabilities, leveraged by Army



Space Professionals, provide enhanced information superiority and situational awareness, permitting high-tempo, noncontiguous, simultaneous distributed operations. When integrated with complementary airborne and terrestrial-based systems, Space-based systems provide the Joint Warfighter and operational commanders with unprecedented options that enable strategic responsiveness.

The Army developed a comprehensive Army Space Master Plan outlining how to best guide the development of Space capabilities, and to incorporate those capabilities as key enablers into its current and future forces. There are three core Army Space objectives guiding the assessment and prioritization of these capabilities.

These objectives are to:

- Influence development and design of future Space systems and their operational concepts to support the full range of joint ground force operations;
- Improve the ability to exploit Space systems by the current and future force; and
- Facilitate delivery of Space capabilities that address Army requirements.

Achieving these objectives requires an Army combat developer community that can understand, substantiate, articulate and defend Space requirements supporting the Warfighter. The Army must continue to influence the development, design and deployment of National assets to incorporate responsive, assured and timely support to maneuver commanders from the initial design phases. To fully exploit these future and current Space-based assets, a complementary mix of highly trained Army Space Cadre and other Space Professionals is needed, particularly within the areas of satellite communications (SATCOM) and intelligence, surveillance and reconnaissance platforms.

There are, however, associated issues the Army must address to ensure future force mission success. Military SATCOM (MILSATCOM) programs, for example, must stay on schedule and meet performance level criteria to serve as the primary means of transmitting mission-critical Joint Command and Control, Joint Blue Force Situational Awareness, combat identification, Theater Early Missile Warning and Blue Force Tracking activities related information and data. The Army Space Master Plan recommends the Army seek innovative solutions, including partnering with commercial providers, to overcome MILSATCOM shortfalls in capacity, user access, and delays in capability improvements.

GROUND"

Space Technology for the Army—Operationally Responsive Space

SMDC/ARSTRAT's Technical Center is actively supporting the Joint service Operationally Responsive Space (ORS) Office whose goal is to provide responsive, operationally relevant Space capabilities to the Joint Warfighter. One of ORS' primary objectives is to provide and exploit these kinds of on-orbit capabilities quicker than today, with a shorter development and acquisition cycle. To meet this and other key objectives, ORS uses the most expeditious requirements definition, resource allocation and acquisition processes available to meet the urgent needs of the Joint warfighter. The Army is supporting this initiative by providing a Deputy Director to the ORS office, as well as by staffing other key positions within the office. Responsiveness is the most desired attribute across the entire ORS enterprise range of activities.

The Tactical Satellite Demonstration Program is one example of ORS' commitment to responsiveness. Tactical Satellite's objective is to build smaller, relatively inexpensive, simpler satellites to provide relevant Space capabilities, and demonstrate military utility through operational experimentation. This will enable the capability to build, store, and launch on demand a class of small, inexpensive satellites with plug and fight payloads tailored to meet the existing and emerging needs of the warfighter. Payload concepts addressing communications on the move and persistent battlefield surveillance/characterization are currently being worked in a joint, collaborative environment with the other services and combatant commanders — SMDC/ARSTRAT's Technical Center is the Army's executive agent for Tactical Satellite project planning, development and execution.

Space Superiority—Preserving Space Capabilities

Although the U.S. currently possesses overwhelming Space capabilities, its dominance in Space is not guaranteed. Our Space-based systems, communication links, and ground stations present potentially attractive targets to an adversary seeking to level the battlefield. Preserving and protecting U.S. military Space-enabled capabilities requires Space situational awareness. Just as situational awareness in the terrestrial sense provides Joint warfighters with tactical advantage, Space situational awareness enables commanders to understand the factors that could impact Space information superiority. Investments in Space situational awareness capability represent the most fundamental step in preserving our Space advantage.

Conclusion

Over the past 50 years, particularly within the past 15 years, the joint combat operating environment has evolved, extending vertically into Space. The Army is proud of the rapid growth and subsequent involvement of its professional Space cadre in providing the Joint warfighter with capabilities that simply cannot be matched by terrestrially based assets. In a very short period of time, the Joint warfighter has moved from being just "supported" by Space assets to being truly "Space enabled." Space-based capabilities enable the Joint warfighter to see further, communicate faster, act more quickly and dominate the battlefield in ways only dreamt about when the U.S. Army helped launch America into Space nearly 50 years ago. The linkage between the Army and Space will continue to grow.

"SECURE THE HIGH

Technology >> from page 7

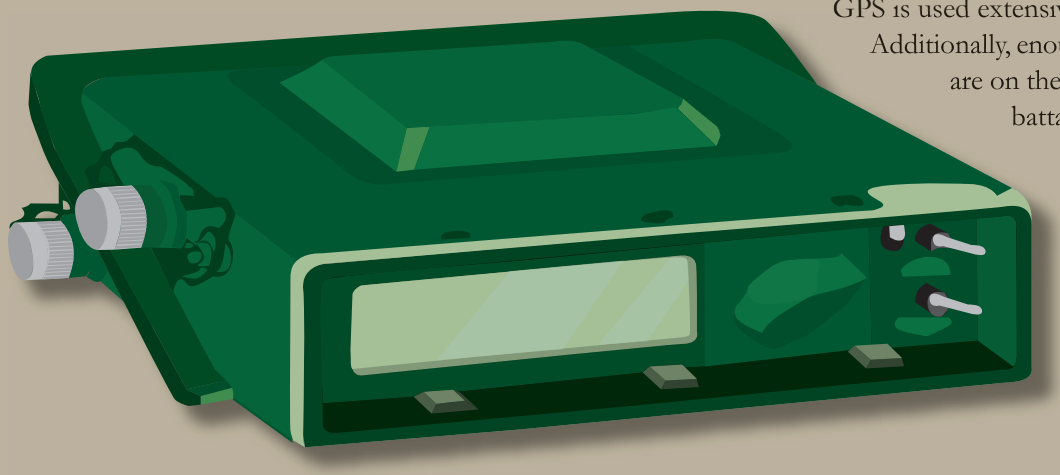
that warfighter request and someone asking, "what if," the Army deployed the Counter Rocket, Artillery, and Mortar (C-RAM) system in less than a year. Charlie Battery, 5-5 Air Defense Artillery from Fort Lewis, Wash., was the first unit deployed to Iraq for a C-RAM mission. Today, the system and the Soldiers manning it are destroying the threat and saving lives.

Presently, the 1st Space Brigade has two Army Space Support Teams in Iraq. Those teams are another example of someone asking "what if?" and being a visionary and advocate of what could be.

The teams currently deployed, some Army Reserve, some National Guard as well as Active Component, have been on continuous rotation in and out of Iraq since 2003. They bring Space-based capabilities and products to the warfighter and help the staff integrate those capabilities into their planning process. Some future thinker realized that the teams, regardless of component, needed the same equipment and training and it is paying off.

Army Space Support Teams started in 1990 as training teams that deployed in the build-up to Desert Storm to train units that were receiving Small, Lightweight Ground Receivers (SLGRs) or "sluggers." Those were hand-held devices that could receive Global Positioning System (GPS) signals. The SLGR began as a demonstration program — a "what if" — in 1988 with the Army Space Institute. In August 1990, only 800 devices existed in the Department of Defense inventory, but they had proven their worth in demonstrations around the Army. As a result, when the build-up to Desert Storm started, the Space Institute began getting calls from everyone everywhere for the device. The Army gave the Deputy Commander, XVIII Airborne Corps, the job of deciding what units would get the SLGR, and the Army placed an emergency procurement order for more. You all know how important they turned out to be as VII Corps did its "left hook" through the desert.

Since then, the demand for Space-smart Soldiers and Space-based capabilities has continued to grow. Today, GPS is used extensively throughout the battlefield. Additionally, enough Army Space Support Teams are on the Army's books that they have a battalion headquarters looking after them, and the Army is assigning other Space-smart officers and noncommissioned



SLGR ILLUSTRATION
Small lightweight ground receiver
ILLUSTRATED BY MICHAEL KAHL

It started with a "what if?" and a "let's try this."

officers to armies, corps, divisions and joint organizations.

It started with a "what if?" and a "let's try this." My next question is "who are we supporting?" Your answer should be, "We support warfighters." But who are those warfighters?

People brief me and say, "We want you to give us the warfighter perspective." I am not the warfighter. The sergeants, lieutenants, majors, up to brigade commanders are the warfighters, not some general, old colonel or senior civilian sitting in a stateside headquarters somewhere.

For example, the Soldiers and officers in the 49th Missile Defense Battalion in Alaska and the 100th Missile Defense Brigade in Colorado are warfighters. Their missile defense elements are pulling round-the-clock duty, day in and day out, to protect the Nation from enemy missiles. A military police unit with the 49th is guarding the missile fields. And some of the missiles at their disposal are in California. What do those warfighters need to perform their mission better? Is there some software that would better integrate the sensor data and make it more useable both in Alaska and California? What tactic, technique or procedure can enable them to better protect the missile field? If you asked those warfighters, I'm sure they'd have a suggestion or two. Now, I'm not saying that any of this is broken or the mission is at risk. I'm simply saying, you and I don't know, and won't know what is needed, unless we ask the warfighter.

The elements of SMDC/ARSTRAT are just a few of the warfighters who make up our customer base. Over 136,000 troopers are in Iraq; 18,000 in Afghanistan; almost 1000 in the Horn of Africa; over 263,000 Soldiers deployed or forward stationed in nearly 80 countries overseas. They are the warfighters.

Who listens to their capability needs? Who asks the platoon sergeant, platoon leader, the company, battalion or brigade commander coming out of theater what they need? Do you?

Who asks them what they need from Space-based capabilities and missile defense?

I challenge you to think about the individual Soldier, Sailor, Airman and Marine on the battlefield, and the Coast Guardsman along our shores. What can we do collectively to best support them? What do they need? How can technology and Space-based systems serve them?

Assuming we've asked them and assuming we've analyzed the need, let's use the moral of three little stories I recounted earlier to give those who offer a contrary view or a "what if" a fair hearing. Who knows? That view may be

SPACE
The Warfighter's

The following edited comments are from six Warfighters who addressed industry representatives in January at the annual Armed Forces Communications and Electronics Association Conference in Colorado Springs, Colo. *Transcripts and edits by Mike Howard and Sharon L. Hartman*

COL B. Shannon Davis
Deputy Commander and Chief of Staff, Fort Carson, Colo.

It really comes down to Soldiers on the ground — the trigger pullers — and their Families. Our Soldiers are in harms way and the more we can do to bring them back safely, and win our nation's wars is what I'm all about. At Fort Carson, Colorado, we recently had five casualties in Iraq and those Soldiers won't be coming home for a reunion. We have brigades coming in and out of Fort Carson on a routine basis. We've lost about 240 Soldiers just out of Fort Carson and many, many more wounded for life. When I look at how information technology is growing by leaps and bounds everyday, I look at what it can do for the Soldier on the ground to win our Nation's wars and bring them home safely. Our men and women have been sacrificing for a long time. It's been a long war — a long protracted war with a long way to go. Whatever we can do to help them in any way through technology is well worth our best efforts. I applaud everyone out there for being a part of the team to make the folks on the end of the sphere be able to keep their edge from day-to-day, fight-to-fight.

A little bit about the way Information Technology helped in Afghanistan. Back in 2005, we used the Blue Force Tracker and satellite pieces for situational awareness while conducting operations in probably the most mountainous country on the globe. Afghanistan has peaks up to 16,000 feet, and with us having to fly all over that country in and around the mountains to conduct operations, it was imperative that we could see ourselves. The Blue Force Tracker and satellite communications made that possible. It was just imperative that we kept those systems up and operational on a daily basis. We could fly from, Bagram and Kabul out the Pakistani bo rder all the way back to the Iranian border and still see ourselves and be able to text message each other, talk to each other and gain situational awareness. This capability just greatly enhanced our ability to conduct operations over there.

Perspective

While deployed in Iraq, LTC James R. Rice and CSM David H. List, of the Mission Support Element, Fort Carson, Colo., stand guard by their vehicle as an improvised explosive device is detonated in the background. *Photo Courtesy Fort Carson Public Affairs*

This article contains excerpts from the Warfighter Panel at the 10th Annual Defending America/SPACECOMM 2008 Symposium.

One of the other things that we used were overhead platforms that gave us the capability of looking at our operations and the whole country. We used this information as we did our detailed planning with the brigade combat team and when we went out to perform operations. This was invaluable while we went out to interdict or intercept al Qaeda operatives or the Taliban operatives in the country. We used Unmanned Aerial Vehicles, RC 12s, and many other platforms up there en route to doing some of these operations. Maybe we had a target that we were going after and, en route, we were actually getting communications in the cockpit that says "Okay, we've got information while you've been flying and you're four minutes out to your time-on-target, the HBT has moved to this location." With the grid on that location, we could then divert en route and not waste a whole operation. Most of the time we landed on the new location unloaded our troops and took down an HBT because of this.

Those were the types of things that enabled us to do our operations and have the success rate that we did in Afghanistan. Being able to see ourselves, see the enemy and stay on the edge and conduct operations. I will say that the enemy is getting very smart. We can't keep what we're doing from them. They have ways of finding out a lot of things in our operations, so we constantly have to be changing our way of doing operations, utilizing the technology available to us to stay in front of the enemy.

Let me transition into more recent activity in Iraq. I was called up to put together an advisory team last year. I stood up a team of advisors for the Baghdad operational command, which is a three-star Iraqi general and his staff. The newly formed command in Baghdad became responsible for the security of Baghdad and all the Iraqi security forces there. We were the advisory team to interface with the American forces, the coalition forces and his forces — about 66,000 troops total when you include the Iraqi army, the national police, the Iraqi police, the Iraqi soft forces,

"When I look at information technology that's growing by leaps and bounds everyday, I look at what it can do for the Soldier on the ground — winning our Nations wars — and bringing them home safely. Our men and women have been sacrificing for a long time. It's been a long war — a long protracted war with a long way to go. Whatever we can do to help them in any way through technology and through all our efforts as a team of teams is well worth doing and well worth our best efforts."

—COL B. Shannon Davis

etc. I don't speak Arabic, so I went over there and I was working with interpreters and we were setting this advisory team up and shadowing his staff that's controlling all the Iraqi security forces in Baghdad.

The technological edge that we brought to the table with the command post of the future, with our UAVs, with our stealth technology, just with our conventional aviation, with our ground forces, was just phenomenal. It was very slow going at first. The Iraqi operations center was using cell phones and a bunch of stickies, posted on a map. We went from that type of an atmosphere in the six months that I spent there to where they were actually putting Blue Force Tracker like devices on their HUMVEES. They didn't want to go anywhere without us because they knew we had the technological edge, they knew that we could find ourselves in Baghdad. Believe me, Iraqi's get lost just in Baghdad more than the Americans do. That's a big city over there, and they knew we had all the technological tools at our hands to help keep them safe. To help them do their job.

So, that's another tribute to the things technology can bring to the table. We went from those stickies and cell phone calls to get their orders out, to actually producing operations orders hand-in-hand with our ground forces, — working civil military operations to clear Baghdad. As we began to do that, the general populace in Baghdad developed more faith in the Iraqi security forces. They began to flow back into Iraq. This was during the surge period when we brought more forces back into Iraq and we began to go security district by security district and eradicate al Qaeda and other extremists in and around Iraq.

By the time I left in August, the Iraqi security forces had stepped up to the plate. They were doing joint operations with us. They were doing their own single operations and the people were starting to come back to Iraq. They had more faith in the security forces and the government. When the sheiks and the tribesmen around the borders of Baghdad began to have faith, General David Petraeus got them where they would actually come to the table and say they we're tired of the al Qaeda operatives bombing their innocent people indiscriminately, and they wanted to help and assist us. So what they did is they would come and tell us if somebody moved into their neighborhood, al Qaeda operatives, extremists, Iranians that were helping supply the extremists with EFPs (Explosively Formed Penetrators) and things like that, Improvised Explosive Devices, they would say: "Hey, they're here. Come get them. We don't want them here. We want them out of here." That was what the turn of events was in the six months that I was there and it's still continuing today.

I have frequent contact with folks in theater over there and the things we bring to the table to help in the technological realm are just endless. I will tell you that the things we need to develop and keep developing and using on the battlefield are things that could be used in real time, things that can be used quickly, things that are relevant, things that are easy for the Soldier, the NCO, the lieutenant platoon leader, the pilot just out of flight school going into combat for his first time, that are easy to understand, easy to use, quick and relevant to the fight. I think that's a challenge. It's much easier to develop things that maybe show a command post at Washington, D.C. or maybe somewhere else in theater, a situational awareness that doesn't really bring relevancy down to the trigger puller on the ground and I think that's a challenge that we need to always keep sight of.

Let me again reiterate that the Soldiers and Families are what it's all about to me and I think it should be for most people in the military, and I'm not just saying in the Army, I'm saying across all the services. The jointness, the interoperability, and the relevance to the trigger puller on the ground to win and fight our nation's wars to win that next battle is what this really should be all about.

COL B. Shannon Davis
Deputy Commander and Chief of Staff,
Fort Carson, Colo.

COL B. Shannon Davis is currently serving as the Deputy Commander and Chief of Staff, Fort Carson, Colo. Prior to this, Davis was deployed for Operation Iraqi Freedom to Baghdad, Iraq, where he served as Chief, Baghdad Operations Command Advisor Team for Multi National Corps – Iraq. Davis also commanded the 25th Aviation Brigade, 25th Infantry Division, Schofield Barracks, Hawaii and Joint Task Force Wings during Operation Enduring Freedom V in Afghanistan.

CSM David H. List
Command Sergeant Major
Mission Support Element
Fort Carson, Colo.

I've been extremely blessed in combat. I had the first tour with the 1st Squadron, 10th United States Cavalry in OIF I. I was on the patrol that captured Saddam Hussein. When I went back this last tour, I was with the third Heavy Brigade Combat Team, 4th Infantry Division. We killed Al Zarqawi in Baquba. So I've been pretty well blessed in combat operations. From those two tours, I've got two stories I would like to relate to you. These stories are about Soldiers who asked me questions that I could not answer.

The first story is about when we had an Unmanned Aerial Vehicle flying over Baquba. My brigade commander and I were sitting in the operations center with the S3. We were watching the UAV feed as three insurgents were setting an Improvised Explosive Device on the side of the road just outside of Baquba in the canal section. As we were getting UAV feed, we were also sending it down to the battalion headquarters so that they could send a patrol out to apprehend the three insurgents. The insurgents had already dug the hole and set the munitions — they were ready to spring it on some unfortunate individual coming down that road and in most cases that ends up being one of us.

When our patrol arrived, the sergeant first class dismounted with his five man team and, using what we saw on the UAV feed, we maneuvered them to where the insurgents were. The problem was it was two o'clock in the morning. There was no moon, so our guys had to use their night operations goggles. So we maneuvered them through those canals and heavy underbrush. As the insurgents moved to set up the IED to ambush our patrol, we would maneuver the patrol around. I'm sure the insurgents on the ground were thinking "how do these guys know where we are?" Finally after about an hour-and-half, we cornered the insurgents with their backs to the canal. Using the UAV feed, we got the patrol leader to move forward with his Soldiers — all with weapons at the ready, they went and captured the three insurgents without firing a shot. No Americans were injured in any way shape or form.

That was a pretty impressive day.

I went to the After Action Review after the patrol brief. The sergeant first class said to me: "Sergeant major, I could've gotten them in 15

"Finally after about an hour-and-half, we cornered the insurgents with their backs to the canal. Using the UAV feed, we got the patrol leader to move forward with his Soldiers – all with weapons at the ready, they went and captured the three insurgents without firing a shot. No Americans were injured in any way shape or form. That was a pretty impressive day."
—CSM David H. List

minutes and I wouldn't have had to kill myself for an hour-and-a-half slipping around in that mud out there. I needed something like an FBCB2 (Force XXI Battle Command, Brigade-and-Below) about the size of a blackberry with some type of satellite feed so that I could've seen where they were moving." I told him I wasn't sure we have anything like that developed but that I'd ask about it later.

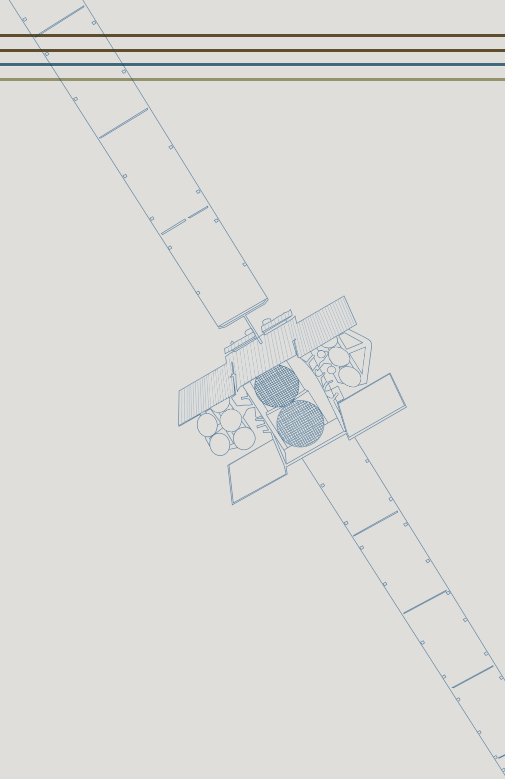
The second story involves engineers who had to do a route clearance up on the Iranian border. They asked me to ride with them, so I went to their patrol brief. We did our pre-combat inspections and checks before I mounted up with this young man and his NCO. As I talked to this young specialist, I learned that he had been in country for 18 months with a one-month break. He said to me: "I've only been blown up 47 times and my buffalo has only been tipped over five times." He added: "You know what? Even with the crew system we have onboard and the electronic control measures I have back here in the back of the truck that I turn on every time we go out, for some reason they still seem to blow me up." Then he asked me: "Isn't there some kind of system that can fly over and either explode these things before I get there, or render them non-mission capable? Can't they just take a satellite and burn those things right out of the ground? I'm sure they can see them from up there." And I said: "I wish they could do that, but right now you and I have got to clear this route." So we rolled out. We were right outside the gate not ten minutes before we found an IED. Luckily it didn't go off. The Soldier and his NCO dealt with it — they took that thing apart, disassembled it and got it set so the Explosives Ordnance Disposal guys could come pick up the pieces and figure out who the bomb maker was that day.

The point of these two stories is that in all my experience, in all the operations that go on from day to day, it's that young Soldier with boots on the ground with the staff sergeant, sergeant first class, lieutenant and captain leading him. These are the guys it's all about. So anything — anything — that can be done to help our Soldiers who are on the ground come home safely with all their fingers and toes would be a wonderful thing.

LTC Thomas Powell
G3 Senior Mission Command
Fort Carson , Colo.

I was in Afghanistan two times — first in 2002 and again in 2006 and 2007 — so I got to see a change in the country which was heartening to see to say the least. I was the J3 for a new Joint Task Force that we had just stood up. Task Force Paladin was organized and designed to destroy the Improvised Explosive Device network cells in Afghanistan. We had a kill-capture mission and to take down the IED cell leaders was obviously one line of operation. We all know and understand that IEDs are a dangerous system out there. The fight in Afghanistan and the fight in Iraq are quite a bit different from the perspective of the IED fight. Also the fight is different. If I was to show you a slide about Intelligence, Surveillance and Reconnaissance assets in Iraq, you know it would be spaceships flying everywhere, and the Afghanistan slide would have a biplane. That was a little joke we used to have over there. We were always ISR hungry over there trying to get more information about how to take down these cells.

It was getting better and better as time went on, which brings me up to the bandwidth issue. At the Soldier level, we always heard a lot that bandwidth was a problem. There's lack of bandwidth in Iraq, so why don't we bring it on over to Afghanistan. Then we would have trouble when you go out to some of these distant places and jump onto a computer there and it would take forever to download and send an operation order across. We had our own internal problems. We found out also that you can't just blame the bandwidth because whenever a communications expert came down there to figure out how to best wire everything up, it was miraculous how the bandwidth got better. I think Soldiers at the troop level so often don't understand what it is in the C4ISR community that is going on, but will blame other guys for a lot of stuff when we can obviously help ourselves.



CSM David H. List

Command Sergeant Major
Mission Support Element
Fort Carson, Colo.

CSM David H. List serves as the Mission Support Element senior enlisted advisor, Fort Carson, Colo. In June 2004 CSM List assumed duty and deployed to Operation Iraqi Freedom-5 as the 3rd Heavy Brigade Combat Team, 4th Infantry Division Command Sergeant Major. List also served as the 1st Squadron, 10th U.S. Cavalry Regiment Command Sergeant Major in June of 2001 where he served with the Squadron for three years, participating in Operation Iraqi Freedom-1 leading the 4th Infantry Division's attack into Iraq.

Along that same line of thought, I want to address information sharing. In the Kosovo war, JSTARS was a new platform. At least for us in the Army, we saw it as a strategic asset. We learned that we needed to connect the dots from information we had on JSTARS with our own information we knew about our internal operations. By doing this in one operation — long story short — it enabled us to take out a whole lot of artillery. After the fact, we sat down and said well there should be a system, there should be an analytical system that makes those kinds of things happens together. When we know there's a fight going on that's utilizing certain weapon systems that give off certain signatures, it should be the community of smart people that bring together some kind of way to make that happen. Obviously right now it's a lot of those S2 kinds of guys connecting those dots and making it happen, but that was one small success story of bringing what was considered a strategic asset to a very tactical area bringing them together and taking care of the enemy.

The same thing kind of happened in Afghanistan a number of years later. Now Afghanistan is not an urban fight. There's no Baghdad. Kabul's got four million people, but we don't have a big fight going on in Kabul. It's a lot of small villages and compounds where the enemy is trying to intimidate the locals, and that's where he lives and that's where he gets sanctuary through intimidation or support. That's where we had all our small units running operations out of all these small forward operating bases all throughout the country. One of the things that we saw, because we were trying to take out the cells, was as the Joint Task Force that I was in, we had access to a lot of the communication intercepts capabilities and so we were tracking different enemy players on the battlefield. Obviously the good ones don't talk on their personal cell phones, but other underlings do and that's how we got a lot of information. That became a pretty successful thing. As a matter of fact, we were able to track one of the bad guys down while he was in the gas station right on the highway right there outside the gate calling it in.

The final thing is the young Soldiers and those young captains who have to figure out these plans to make things happen, they are really focused on the Pre-Combat Checks and the Pre-Combat Inspections — making sure that their kits are ready to go. They don't have all the time in the world to connect the dots and that's what I would emphasize. There are a lot of information systems out there. We've just got to figure out the best way to share it, connect the dots and then get that down to the junior leaders out there who are actually pounding the ground and killing the enemy.

"We had our own internal problems, we found out also that you can't just blame the bandwidth — you know, the genie in the sky — because whenever a communications expert came down there to figure out how to best wire everything up, it was miraculous how the bandwidth got better. I think Soldiers at the troop level so often don't understand what it is in the C4ISR community that is going on, but will blame other guys for a lot of stuff when we can obviously help ourselves."

—LTC Thomas Powell

LTC Thomas Powell

G3 Senior Mission Command
Fort Carson , Colo.

LTC Thomas Powell is the current Chief of Training for the Fort Carson Mission Support Element. Powell recently returned from Afghanistan where he served as the J3 for Joint Task Force Paladin in support of Operation Enduring Freedom. Prior to deploying to Afghanistan he served as commander of 2-362nd Field Artillery Battalion at Fort Carson, Colo.

LTC James R. Rice

Deputy Commander,
3rd BCT, 4th Infantry Division
Fort Carson, Colo.

It doesn't matter for me if it comes from Space — I just want the capability. Some of these things that I'm going to talk about really can be done by long-dwell air-breathing systems and that's fine with me. That's fine with the Soldier on the ground, but what I'm going to talk about is my experiences as a leader with troops at what I call the pointy end of the spear where it's dirty, muddy, rainy, freezing cold or blazing hot and, often times, those leaders at that point don't have a lot of things that they can do to help them. They don't have hard-wired systems the general officers have at their headquarters. They don't have hard-wired systems that their brigade commander has at his headquarters, even though that headquarters may be in a tent.

The first thing is: Space isn't broken. We could not have done the operations that we did in Iraq without the assistance that we got from Space. It would not have been possible. What I am trying to do is identify challenges faced by leaders in combat. You've got to remember that I've personally been back from Iraq for just over a year now, so my information is dated. I think the underlying concerns and the underlying themes do remain valid. So, it's not an indictment of Space with these themes I'm presenting, but a way to determine how we can best support leaders and fighters on the ground.

Space doesn't do that much that the average rifleman can see, touch and feel. My driver on the last tour was a guy named Buckley. He was a private first class when we started out. He's back in Iraq today and he's a sergeant leading his own squad in combat. I asked Buckley one time: "Hey, what do we get out of Space?" Buckley said: "I don't need anything from Space. All I need is my M4, a GPS and some way to talk all the way around the world and I'll kill every AIF in Iraq." AIF is the anti-Iraqi forces. I didn't say anything to Buckley. That's the rifleman's perspective on this. The reason is they don't look at it the same way technology developers or even military leaders do.

Blue Force Tracker versus FBCB2 — For an infantryman, Blue Force Tracker is what we call a system that is satellite-based where you've got blue feed and red feed if it's plugged in there into your vehicle. You've got a computer screen in your combat platform and it gives you situational awareness. FBCB2 is the exact same thing except it is a terrestrial-based, ground-based, radio-based system. The challenge is this: I was in the 4th Infantry Division — at one time the Army's digitized division — and we were in the stubby pencil analog brigade of the Army's digitized division. In very, very short order, we went from acetate and paper maps and radios to the EPLRS-based FBCB2 system and then deployed the brigade into combat. We had quite a learning

curve figuring out how that stuff worked, but what we found was our own situational awareness obviously went up exponentially. We also learned some of the challenges with the satellite-based Blue Force Tracker system in the Army vice the big-scheme tracking blue forces and FBCB2.

The challenge is that for rifle, tank and scout platoon leaders, their offices are in a tank or Bradley or a HUMVEE. Sometimes their office is in their rucksack on their back — that's all they have. There's nothing that's hardwired. It's brutally hot or unbelievably cold. Somehow, someway, sometimes at the same time — and I don't know how that works out — but the bandwidth shortfall occurs at the lowest level, at the pointiest end of the spear, where the Soldiers and their leaders are in direct fire contact with the enemy and they have the least ability to communicate data back up the chain or receive information down the chain that's analyzed for them to be able to use.

So we've got to expand the operating spectrum at the lowest levels. The bandwidth has got to be able to support live updates to multiple systems. This is one of the things that slows down even getting information into the brigade headquarters, let alone pushing it further down to company commanders and platoon leaders. We blasted out our information from our systems down to Kuwait, through trailers, back up to Baghdad, bounced back up again, came back north to our division headquarters. All of that happens pretty quickly. All of that can also give you latency in your system and cause delays in getting that information back to the brigade headquarters. The headquarters is where you have your real analytical capability and then the ability to push it back down to the Soldiers in the field, so this slows down the operation. Without the information passing — and more importantly the knowledge passing — the information doesn't do you much good. The analyzed intelligence gives that leader on the ground the knowledge that he or she needs to be successful in the operations.

It's also important that everything that goes through brigade combat teams airspace has some ability to update and relay that to their common operating picture. We've got pretty good Situational Awareness on the combat platforms within the reach of the systems, but there's a significant number of vehicles both in the air and on the ground out there that aren't combat platforms and don't show up. When they're in your battlespace and they get in trouble, now they know where you are and how to get a hold of you on the radio. It's really nice to know they're there before they're in trouble.

To put it into perspective, we operated about 200 kilometers wide east-west by 230 kilometers north-south. That's roughly the size of Vermont and New Hampshire. Yet we dominated that terrain with just about 5,000 Soldiers — unheard of. In World War II, there would have at least been a corps in an area like that. What is hard for up-to-date folks to grasp is that really, probably as little as ten years ago, there'd at least have been a division there if not a division-plus.

Electronic Signature Dampening — All the systems we've been talking about give us a tremendous signature on the ground, and our enemies are not stupid. They hire some stupid people to go do stupid things for them. We did our best to take care of our guys, but the enemy has got some really brilliant people who work for them and I don't want to discount what they're capabilities are. With off-the-shelf parts, they're building systems that can track us on the ground because of the electronic signature that we create. Now I don't know how we can shut down that signature without limiting our ability to communicate

"At the present time — if everything's working right — we can see virtually every combat platform that's out there. We've got to develop the capability to see every Soldier, Sailor, Airmen or Marine that goes outside the wire. For lack of a better term, I guess I'm looking for something like a Space UAV."

—LTC James R. Rice

LTC James R. Rice

Deputy Commander,
3rd BCT, 4th Infantry Division
Fort Carson, Colo.

LTC James R. Rice has served as the G3 (Operations Officer) for the Senior Mission Command and the 4th Infantry Division, Fort Carson, Colo., since February 2007. Prior to this assignment, Rice served as the Deputy Commander of the 3rd Heavy Brigade Combat Team, 4th Infantry Division. Rice deployed to Iraq with the Brigade in October 2005 and returned with the Brigade's trail party in November 2006.

and generate situational awareness. But I think with a combination of Space-based monitoring and ground-based signature dampening — Space-based monitoring to say hey wait a minute, that group on the ground is putting out a heck of a signature right now, something's not working right — I think we can get into a better scheme of protecting our force on the ground.

The Tactic, Technique and Procedure — or TTP — is what we use to help identify, interdict and destroy an Improvised Explosive Device (IED). The problem with that is it changes all the time because as we figure out a way to defeat a particular IED, the enemy adapts to that and we have to constantly change. While it does protect the force, it doesn't really do anything to eliminate the threat of IEDs. No matter how many IEDs I picked up out there, there were always more IEDs back out on the ground. There seems to be almost a limitless supply of stuff that the enemy can use to try to blow you up with. So, how do we apply technology to help defeat the IED and essentially render it ineffective?

If I go down with a heart attack (right now, you can) take me to Memorial Hospital and using computer imaging, a heart surgeon can take a look at Jim Rice's heart. Not a facsimile of my heart, not a rubber model, but the real thing. He can find the flaw and, if it's fixable, go in, and maybe not even with open heart surgery anymore because of other surgical techniques, fix the flaw. And maybe I'm out doing PT again next week. That's exactly how state-of-the-art heart surgery is done.

Using that exact same imagery, I believe, with Space-based systems, we can develop persistent monitoring of our roadways. We can link that directly to vehicle convoys, and that Space-based system, using computer technology, can determine that there are disturbances in the ground, whether it's on the side of the road, in the road, in the dirt pile beside the road, and relay that directly to vehicle convoys that are on the ground so that they can stop in time to secure the area, render the IED safe, protect American forces and press on with their mission. When we can develop that technology and field it, we've now done something that makes the IED ineffective against American forces. And that starts putting the IED network out of business. By doing that, we take one of the key killers of American forces off the battlefield. Everybody knows that's the main threat that the enemy uses right now. I don't know of any Marine or Soldier who has been defeated anywhere in Iraq or Afghanistan in a straight up fight. So that's my challenge to industry and the Space community: Figure out how to put that into the vehicles.

We talk about pushing technology to the lowest level. Let's use the blackberry as an example. Now if I drop this thing in the creek, it doesn't work anymore — and trust me, American Soldiers can destroy an anvil with a rubber mallet, so you've

got to make it a lot harder than a blackberry is now. However, the capability is there. The newest one has just exactly what Buckley wanted. It'll let me talk anywhere around the world and give me a GPS. I've got a push to talk for instant walkie-talkie. I can send e-mail. I can take photos. I can receive photos. Now you've given that platoon leader, platoon sergeant, squad leader, company commander something that is truly effective in giving him the ability to not only receive information at his level, but send it back up the chain of command to his battalion commander, brigade commander, division commander, where there are more resources to analyze what that guy's seeing. So that's the kind of technology that we've got to push out to the lowest level so the Soldiers have it to use.

The final thing — At the present time we can see virtually every combat platform that's out there. But, we've got to develop the capability to see every Soldier, Sailor, Airmen or Marine that goes outside the wire. For lack of a better term, I guess I'm looking for something like a Space UAV. The key is we've got to have persistent surveillance to the areas where we operate. Five-thousand Soldiers cannot operate in 50,000 square kilometers with a Soldier at every piece of terrain all the time. But we do need eyes on every piece of terrain all the time. So why not develop something along the line of a Space UAV that you can bring back to earth, refuel, assign a new mission, and fly wherever needed when needed. That's what generates that ability to maintain persistent surveillance in that giant area of operations that our brigade had.

With this capability, we would be able to see where problems are cropping up. Then, using the massive bandwidth we've been given and this small communication/knowledge passing device we've developed and fielded, we can surge the force to the critical time and the critical place on the battlefield and get them out there to accomplish the mission by defeating the enemy and then bring them all back home safe again.

BG John E. Seward
Deputy Commanding General for Operations,
U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command

I'd like to address some of the ways Space-based technology is empowering our warfighters and I'll address what the Army sees as gaps in those Space capabilities. A couple of months ago I heard a warfighter say that Space doesn't do much that the average rifleman can see, touch or feel. I think that sometimes the same thing can be said in general of those systems we use to empower our warfighter.

I'd like to start with my own experiences in Iraq. I commanded the 108th Air Defense Artillery Brigade during Operation Iraqi Freedom I. We were in direct support of the 1st Marine Expeditionary Force during their attack into Iraq and up to Baghdad in the spring of 2003. I didn't realize how long ago that experience was until I realized I was invited back to speak at one of the brigade functions and I was introduced as Spartan O6 ancient. The technology between 2003 and today has just been astronomical. I remember during my day having 450 kilometers between my units in Iraq without really being able to communicate very well. We had SATCOM phones which allowed me to communicate clearly back to 18th Airborne Corps headquarters in CONUS, but for some reason I couldn't talk to all of my batteries. For all practical purposes, many were autonomous. We never figured out why we couldn't talk to them, but the Army's long range communication equipment called mobile subscriber equipment wasn't compatible with the Marine Corps gear that we were attached to. This forced me to attach liaison officer parties to every Marine regiment headquarters and larger formations to disseminate missile warning alerts.

We didn't have sufficient Global Positioning System receivers in the brigade. We only had one Precision Lightweight GPS Receiver in our brigade tactical operations center. Think about a 100 vehicle convoy in the worst sandstorm in over a century with only one Soldier with a GPS receiver and any clue where we were. Additionally, we didn't have any Blue Force Tracking devices in the brigade. We had to rely on very antiquated means of maintaining situational awareness, but it

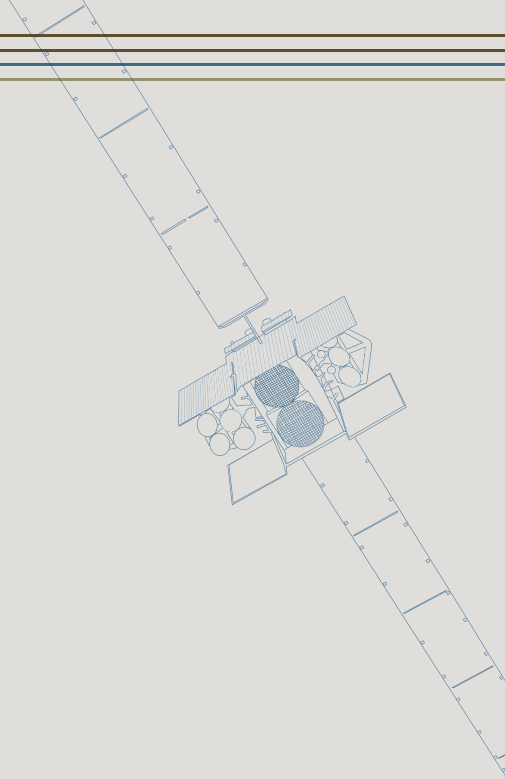
was further complicated by our lack of functioning long range communications equipment, and we were in the days of yellow stickies on the map.

There have been some improvements since then. Every vehicle in the convoy now has GPS. Every three or four of them have a Blue Force Tracking device that feeds into a common operating picture. Department of Defense has made strides to fix the communications incompatibility problem by going to an internet protocol based system and developing the Joint Tactical Radio System. One suggestion for industry is the smaller the better and I will tell you that is improving.

Some of the Space shortfalls as the Army sees them were identified through the TRADOC capabilities needs analysis process and were vetted through the Army Space Council. The Army has determined that the greatest risk to ground operations is the limited throughput and protected military satellite communications capacity. Seamless integrated dynamic bandwidth for battle command on the move through satellite communications is key to land dominance and is key to the Army's future combat systems. You known that in OIF, the forces were using approximately 42-times the bandwidth they used in Operation Desert Storm and that 70- to 80-percent of today's satellite communications capability is currently provided by commercial systems. This shortage of military satellite capacity impacts battlespace awareness, force application, force logistics and joint force protection. A little help is on the way to alleviate that wideband shortfall. On January 18, Department of Defense began the testing phase on its first recently launched Wideband Global Satellite. If all goes as planned, it will be turned over to 1st Space Brigade's Wideband Satellite Control Centers to begin work for warfighters and five more are on the way. Each WGS has ten times the throughput of one Defense Satellite Communications System (DSCS) satellite. The DSCS satellites will remain in use until their remaining operational life.

In regards to filling the gaps for JTAGS — our Joint Tactical Ground Station, which does our theater early warning — to ensure that the theaters have missile early warning, SMDC is updating the needs documents to establish a requirement to modernize and update the JTAGS. It will be upgraded to be able to receive and process the Space-Based Infrared System data. It will get new commercial antennas and its equipment will be relocated from a mobile shelter into a fixed theater facility to reduce manning and funding requirements. This is an interim solution to keep the system viable until 2013 to 2015. Later this year, Space and Missile Defense Battle Lab will conduct a net-centric experiment to begin to define a net-centric replacement capability. The goal is to be able to use multiple sensors and multiple processors netted together to provide theater missile warning. SMDC/ARSTRAT has initiatives to fill these gaps. Most are in research and development; all are geared to provide responsive, timely and flexible deliverables for the Army and Joint formations. Providing these capabilities requires investment across the ground and Space spectrum.

It might be useful to understand how the Army integrates Space capabilities into its future force. We do this at the three-star level via the senior Army Space Council. The council identifies and approves needed capabilities, prioritizes them for the Army and integrates them into its overall toolkit of warfighting doctrine, techniques and systems. The Army also periodically publishes the Army Space Master Plan similar to other master plans in the Army, which helps us synchronize Space capabilities between programs, organizations and processes; identify the key Army needs; recognize potential solutions; and define areas for Army advocacy within the overall national Space security community. Current areas of Army focus include influencing the development and



BG John E. Seward

Deputy Commanding General for Operations,
U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command

BG John E. Seward assumed his duties as the Deputy Commanding General for Operations, U.S. Army Space and Missile Defense Command/Army Forces Strategic Command on Aug. 6, 2007. His previous assignment was as the Commanding General, 94th Army Air and Missile Defense Command at Fort Shafter, Hawaii.

design of future Space systems and their operational concept to support ground operations; improving the ability to exploit Space systems by the current future force; and facilitating the delivery of Space capabilities that meet Army needs and that meet joint needs.

The Army is expanding the number of personnel in the professional Space cadre. The Army Space cadre, which has its core Functional Area 40 officers, continues to expand its influence to the joint Space community in numerous key positions. We've been very successful in placing experienced FA40 officers in positions where they can articulate Army Space requirements while also leveraging emerging capabilities to the benefit of Soldiers on the ground. SMDC/ARSTRAT is not only leading the Army to identify and increase the number of Space savvy people, but they are putting them in positions where they can advocate for the Army.

The council also proposed, and the Army approved, the creation of Space elements that are organic to Army, Corps and Division headquarters. The Space element FA40 is a Space expert on the ground who assists with the assessing and integrating of Space doctrine and Space-based technology into the fight for the commander. An example of this is helping track blue forces and giving them location precision for movement and munitions through the GPS constellation. Eventually Space elements will be embedded in 26 Division, Corps and Army headquarters. The Army is also placing one FA40 Space operations officer in Fires brigades to better enable those commanders to use Space operations and to bring Space-based capabilities into the deliberate planning process and military effects based operations. Currently, the Army has about 90 Space experts FA40 officers and other officer and NCO Space enablers deployed in support of OIF.

What can industry do to help? You may have a technology that will help close the gaps in Space capabilities. As you think about what you can offer, remember that mission readiness has to be our number one priority. What is it that will make the Soldiers on the front line effective and bring them home safe? An emerging technology may be the way

"The Army has determined that the greatest risk to ground operations is the limited throughput and protected military satellite communications capacity. Seamless integrated dynamic bandwidth for battle command on the move through satellite communications is key to land dominance and is key to the Army's future combat systems."

— BG John E. Seward

to help them, but it must be something the meets a need. And as my warfighter friends tell me, in many cases, the technology has to reach down to the platoon sergeant. In other words, it has to serve the Soldier on the ground. I say it can't be a great system that sits in the colonel's office and provides information only to the division headquarters, unless that translates into mission information for the Soldier.

Last August, a warfighter commander reported that the rifle platoon leader and his troops are at the very point of the sphere, and too often they have the least robust system. The company commander is equipped only marginally better than his platoon leader, yet he is the guy we really lean on for information. Industry must develop systems that do not require fixed facilities and that are fully functional in an austere accident experienced at the company and platoon level. By doing so, we enhance the capability of the entire force to include the Sailor, Airmen and Marines. We can empower the warfighter with knowledge across the force and all the means.

COL Timothy R. Coffin
Commander 1st Space Brigade
U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command

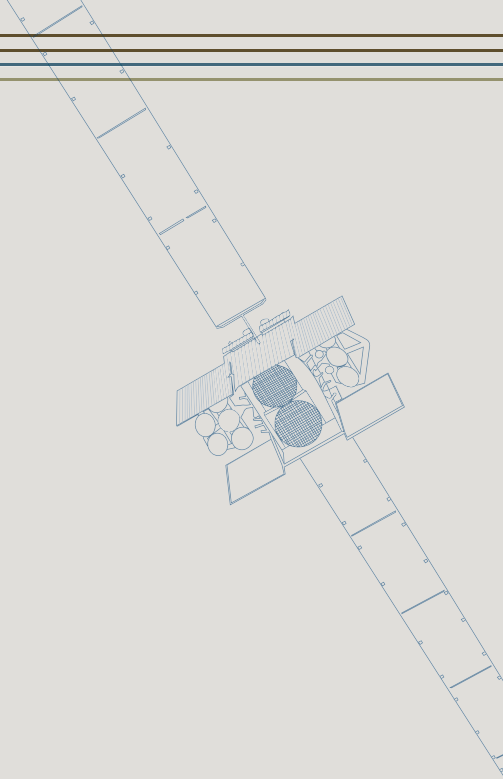
If information is power, information out on the battlefield is life. Information gives you the ability to take life, the ability to give life. And that's what we need to give to our Soldiers out there — that ability out on the forward edge.

I'm going to talk a little bit about the 1st Space Brigade. I'm very proud of the things that we've done. We've had forces deployed in support of Operations Enduring and Iraqi Freedom ever since they started. We have Soldiers and Civilians in over 14 different locations, seven different countries and within just the brigade itself, not the entire SMDC/ARSTRAT; we run 10 24/7 operations in support of what's going on. We're a mixed component headquarters. We've got active Soldiers, we've got Guard Soldiers and we've got Reservists. We're very proud of the Reserve and Guard Soldiers and the things that they do. They are all contributing members of the team. We don't treat them any different. We have the same expectations for them. We train them the same way and they will tell you for sure that we deploy them the same way, because just about everybody in our command has been deployed out the door, downrange in support of our nation's business.

Some of the major missions that we have: we control the DSCS and WGS payloads. We do missile warning and provide Space support to Marine forces; we help expedite commercial imagery to the people who need it on the ground; we provide Space Situational Awareness to help know what's going on in our area.

In Space Situational Awareness, we deal and we fight in an electronic realm. Our business is in the area of digits and electrons that flow through the air. So as a Space community, it is important to us to have knowledge of what's happening to each of those. The data paths, whether or not they're being disrupted, if they're being disrupted by who, is it intentional, is it unintentional, are we doing it to ourselves? So, it's important that on a global basis, 24/7, we can have situational awareness of that level and fidelity. We're not there yet, but it's an area that we're growing in — Situational Awareness and understanding. It's an important part of what we contribute within the brigade itself.

When you talk about WGS, you're talking about 1.2 million different configuration manners, sets and settings that you can do on that payload. This is a huge complexity for young Soldiers — some of them don't look like they're old enough to be away from home — who are working and controlling that payload. That caused me a little bit of concern as I first started thinking about it, but then as I watched them get trained to do that payload, I got a different impression. One morning I saw the Soldiers come into class with the Boeing experts who built the satellite and were working them through on the software. This young private came in and said to them, "You know, I was looking at this code last night and



COL Timothy R. Coffin

Commander 1st Space Brigade
U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command

COL Timothy R. Coffin assumed command of the 1st Space Brigade, U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT) on July 27, 2006. In this position he is responsible for the supervision of three one-of-a-kind battalions — the 53rd Signal Battalion (SATCON), the 1st Space Battalion and the 117th Colorado Army National Guard Space Support Battalion — which are charged with providing day-to-day Space support to the operational Army.

this switch here is not doing what we want it to do, so I rewrote the code, and here's the patch for you if you want to put it into the program to enable the system." So we've got some tremendously talented young Soldiers out there who are passionate about their business, who are digging into the details.

A little bit about the Defense Satellite Program, or DSP. People are aware that the joint program between the Army and the Air Force to create a follow on to JTAGS ran into a funding issue. Basically, all the funding that was available was pushed toward fixing problems on the Space segment of SBIRS. Good News! We now have some sensors on orbit. We're getting some great information off those. It's going to be a tremendous benefit for us, but we still have to solve the problems: how do we get that information down in an assured way to people on the ground and how do we make sure that the architecture is supporting the warfighter forward in theater. We have put together working with the Air Force, working within the Army community for a way ahead for this program that is going to leverage that information off the new sensors and bring it into what will be an upgraded joint tactical ground station and allow us to leverage that SBIRS information.

We put a lot of responsibility on the shoulders of a young sergeant, a young Soldier in that JTAGS van. A van normally has about three people in it. You'll see some changes here as we go throughout this next year. We'll do some experiments with the system to make sure that we've got the configurations right. We'll probably experiment with dismounting the system out of its current shelter, and the reason is that we built this system in a paradigm where the cold war was still the ruling concept of operations of the day. That's just not the way we do business anymore. As with many of the systems that we operate within the brigade, we're driving it toward a multiple configuration set up where you have systems that can be mounted if you need to be mobile and move across a battlefield, but just as easily, you could hit the releases on the inside, pull out the racks, plug the information or plug the systems into a fixed architecture and provide support from there. That allows us the flexibility to provide support across a wide spectrum of potential operations that we could face in the future. We've got the last DSP satellite up on orbit. We are waiting patiently for the first geosynchronous Space-based infrared system satellite to go up but we're very pleased with the data that is coming off of those, and we think there's going to be a huge contribution this kind of data can make for the warfighter. We just haven't figured it all out yet. Those of you who have worked in this community for a period of years know

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—COL Timothy R. Coffin

Successes from the Field: Focus on the 4th Infantry Division (Mechanized)

Tactical Army Space Operations –

Robert N. Zaza and William T. Coffey Jr.

There has been recent Army Space force integration efforts in which Space Support Elements provided Space support to combat preparations and operations, including the 4th Infantry Division Space Support Element's preparations for its Operation Iraqi Freedom 4 rotation, and its activities during the combat deployment. Operation Iraqi Freedom 4 was 4th Infantry Division's first deployment as a Modular Division headquarters.

While deployed, the 4th Infantry Division headquarters served as the Multinational Division — Baghdad at Camp Victory, Baghdad, Iraq, from December 2005 to December 2006. The 4th Infantry Division Space Support Element was organized under the original division Space Support Element modified table of organization and equipment (MTOE) and comprised four Space operations officers and two noncommissioned officers. Future Division Space Support Elements, including that of 4th Infantry Division, will have two officers and two noncommissioned officers.

The 4th Infantry Division Space Support Element was the second element to provide extensive Space support to its staff and command group during garrison operations. During garrison operations at Fort Hood, Texas, July 2004 to December 2005, the 4th Infantry Division Space Support Element:

• Provided knowledge of Space segment for Space Based Blue Force Tracking when requested or required to the Force Integration Division and G6 to support integration of Blue Force Tracking devices into the Common Operational Picture. In 4th Infantry Division, the Force Integration Division was the Office of Primary Responsibility for Blue Force Tracking overall, and the G6 was Office of Primary Responsibility for configuring Division servers to receive Blue Force tracking data feeds. This division of labor may provide a model for future Space Support Elements.

• Formed an Imagery Working Group with the Geospatial Information and Services section and the G2 Imagery Intelligence section. As a member of the Imagery Working Group Space Support Element was responsible for providing commercial, unclassified limited distribution, multispectral, and archived national imagery, and to assist with providing Measurements and Signatures products by directly coordinating with members of the Army Measurements and Signatures federation.

• Created Measurements and Signatures Smart Cards to support the G2 and Brigade Combat Teams' S2s in formulating Measurements and Signatures requests

• Conducted extensive Space input to Intelligence Preparation of the Battlespace during the Military Decision Making Process. In addition to developed the Space operations annex to divisional operation plans or operation orders, they created an extensive Smart Book on Joint and Commercial Space support to theater providing detailed, exhaustive information.

• Conducted extensive leadership education across the entire staff and command group. This education ensured that the division headquarters was able to better access, integrate, and exploit all available Space capabilities and effects throughout its combat deployment.

• Provided Space Support by managing highly classified aspects of planning, because of their clearances and broad yet deep technical knowledge.

The Space Support Element contributed to combat operations through both traditional Space Force Enhancement activities, and managing and planning classified activities. Both the Geospatial Information and Services and G2 Imagery Intelligence sections relied heavily on the Space Support Elements to fulfill their requirements for unclassified commercial imagery during combat operations. Classified activities were major Space Support Elements contributionsto operations, comprising about 80 percent of the chief's effort, significant effort for the deputy, significant noncommissioned officer

effort, including shift work. During combat operations at Camp Victory, Iraq, the 4th Infantry Division Space Support Element:

- Provided traditional Space Force Enhancement support on the Joint Operations Center floor through the presence of one officer who also served as Battle Major.

- Led, managed and planned classified activities.

- Collaborated daily with the Geospatial Information and Services and Imagery Intelligence sections as a part of the Imagery Working Group. As a result, the Space Support Element provided commercial, unclassified Limited Distribution, and archived national imagery. Furthermore, the Space Support Element enabled 4th Infantry Division staff to get quality Measurements and Signatures and multispectral products in a timely manner through direct coordination with the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command Advanced Geospatial Intelligence Node and the Measurements and Signatures federation.

- Assisted the command in postponing the Blue Force Tracking related Satellite Communications ground segment maintenance schedules due to the impact the schedules would have had on operations, based on their detailed knowledge of the architecture.

- Coordinated U.S. Air Force Silent Sentry[1] electromagnetic interference detection support to the G6 and signal units.

Taking the lead in classified activities continuing to cover all facets of Space Force Enhancement, the 4th Infantry Division Space Support Element followed the 101st Airborne Division (Air Assault) and 3rd Infantry Division Space Support Elements in cementing the Elements' value to division-level plans and operations — providing effects for the commander; providing their expertise on Space systems, capabilities, and architectures; and using their ability to integrate Space systems, capabilities, and architectures in ways that better enabled the headquarters to plan and conduct combat operations.

ROBERT N. ZAZA has been a member of the Tactical Space Team since February 2005. An FA40 LTC in the Army Reserve, he holds the Air Force Senior Space Badge, and has served in various leadership and staff positions, including Combined Joint Task Force-180 Army Space Support Team Leader; S-2, 4th Brigade, 4th Infantry Division; Observer/Controller, 91st Division; Antiterrorism and Force Protection Officer, J2, U.S. Southern Command; and S-2, 5th Battalion, 20th Infantry. He is currently a Senior Space Operations Analyst with CAMBER Corporation. (robert.zaza@smdc-cs.army.mil)

WILLIAM T. COFFEY JR. has been a member of the Tactical Space Team since February 2003 and has served in the Space and Missile Defense Battle Lab since 1993. A retired Army Military Intelligence Officer, he served in various tactical and strategic assignments to include 2nd and 4th Infantry Divisions, V Corps and Northern Command. He served in Iraq and Afghanistan as a Department of the Army Civilian in 2006 conducting assessments of Theater Space Operations. He is currently a Senior Space Operations Analyst with CAMBER Corporation. william.coffey@smdc-cs.army.mil

[1] The Air Force's 16th Space Control Squadron "provides near real time event detection, characterization, geo-location and electromagnetic interference reporting for critical satellite communications systems in direct support of combatant commanders" using the he Rapid Attack Identification Detection Reporting System (RAIDRS) prototype. After an initial successful test, RAIDRS "has been continually deployed in the Area of Responsibility as Operation Silent Sentry since July 2005." U.S. Air Force Fact Sheet *16TH SPACE CONTROL SQUADRON* at http://www.peterson.af.mil/library/factsheets/factsheet_print.asp?fsID=8403&page=1, retrieved 20 July 2007.

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that we didn't figure out DSP for quite awhile, not until after it was up there for awhile did we figure out other things we could do with it. We're trying to accelerate that process with Space-based infrared system, but with the fidelity of the new sensors, you're going to gather a lot more information about what's happening on the battlefield.

A little bit about Army Space Support Team — we have a total of 27 of these teams in the force structure. They're across the Active Component of the Army, they're in the Colorado Guard force and they're in the Army Reserves. We've just stood up one of the Army Reserve Companies, picked a commander for it, and he's in the process of recruiting and training his Soldiers. One of the teams that will end up in this company is one that we just deployed out the door here this past week. (In the month of January,) I've deployed three different teams into the Iraqi or Central Command area of operations. That's just in one month alone. That gives you kind of an idea of the operational tempo, the things that we face in our operations. We're constantly rotating forces in and out of theater to do that.

We integrate them with the Marines and what has been a great news story is how we've put together a joint team, even though we don't have it on the books, we've pulled in an Air Force weapons officer who's trained in Space, a Marine Space officer along with an Army Space Support Team, and the capabilities they have brought to the warfight have been extremely successful in the kinds of things they've been able to do, leveraging on each others experience, background, depth of knowledge and expertise.

Another area where we had two teams in country recently, one was getting ready to rotate out and come back is our Commercial Exploitation Team. This mission was built on what was a demonstration program called Eagle Vision II. We're pulling back out that hardware in order to refit it. We've just spent about $2 million in recapitalizing the system, making it modular, integrating it more closely with the National Geospatial Agency, and the demand for the products out of this system have been increasing about 200 percent a year since we deployed it forward in theater. These kinds of products, the commercial products are so important for our young folks out there on the field because they can take a map product, an image, lay it with the Iraqi policemen that they're working with, show them on the map, saying don't go over here because our crossfire is going to be going across into that building. This is the building where we think they are. How do we get there? Being able to explain information to Red Cross workers about areas they can and can't go into. Hand this to our coalition partners whether or not they have a security clearance. There's a huge advantage to having this kind of capability out there in the battlefield.

I'd like to close with just some themes that are on my mind for how we do things. We talk about the architectures and how we bring all that together and how we do modeling and simulations of all those pieces. There's a problem here and that is most of our models and simulations don't get down to the Soldier level. They don't get down to that actual user. They replicate often times the collective nodes and the larger pieces but they don't deal with things like rain-fade and terrain blocking and actually being in downtown Fallujah, with the dirt, the mud, the grime, the line of sight issues. If we're really going to put together good systems, we've got to have that level of fidelity and resolution. We have to look at the architectures not from the system's view, but from the Soldier's view. If we look at the architecture and say, "What's the best way to set up the architecture to support the WGS satellite?" We'll come up with one solution. "What's the best way to set up the architecture to protect the information in the system?" We may come up with a little bit different architecture.

We need to make sure that as we're putting these things together, we are looking at the systems from the perspective of the Soldier, the Sailor, the Marine, the Airmen — the users — who are depending on this information to save their lives and to execute their mission. When you look back up at the system from that level, you're going to design the system differently in order to support the end user on the far end. We need to look at network centric solutions across the board that converge things together as compared to where we are today. We're just not at that level yet where things can pass seamlessly from one system across to the other. Within the command, we're looking at things where we can capture near-term spirals, things that give us high payoff and high value as we do that. We're trying to set the conditions for the long-term so that we've got the right requirements out there and can drive things to success over the long run. We've learned in the operations we've had so far that working jointly is the right answer. We've got to get over any service parochialism, any barriers that exist between things right now and put things together in this manner and build them that way from the ground up.

While deployed in Iraq, LTC James R. Rice and CSM David H. List, of the Mission Support Element, Fort Carson, Colo., stand guard by their vehicle as an improvised explosive device is detonated in the background. *Photo Courtesy Fort Carson Public Affairs*

"Space RESERVED"

By Sharon L. Hartman
SMDC/ARSTRAT Public Affairs Office

The Army's role in providing Space support to the warfighter continues to grow and the need for Soldiers to fulfill that role is growing as well. Since the beginning of Operations Enduring Freedom and Iraqi Freedom, Army Space Support Teams from the 1st Space Battalion, 1st Space Brigade, have deployed in support of the warfighter. The teams started with Active Duty Soldiers and grew to include Guard Soldiers from the 117th Colorado Army National Guard Space Support Battalion, and then Reserve Soldiers to fill slots when necessary. But, Reserve Soldiers are now being relied on to deploy as entire teams.

In November 2006, the first Reserve Army Space Support Team deployed to provide Space support to the Multinational Corps-Iraq. MAJ John Hennessey, team chief for the six person Army Space Support Team 18, had actually deployed once before filling a slot as the Operations Officer on Army Space Support Team 1 in 2003. This time the tables were turned as one Active Duty Soldier volunteered to fill a vacant slot on the Reserve Team 18.

SSG Rob Wayman filled the Satellite Communications Control NCO gap for the team. This was Wayman's second deployment with an Army Space Support Team, the first one with Team 3 that replaced Hennessey's Team 1 in 2004.

CPT James French, the operations officer, was also on his second deployment. His first was as an engineer with a battalion that supported the 101st.

SSG Jay Stephenson served as the team Intel Analyst. Stephenson was the oldest member of the team. Having already left the Army, he returned to service when his son decided to join the Army.

SSG Yolanda Rife was the topography analyst for the team and also made a return to service when she reenlisted shortly after Sept. 11, 2001. Rife was attending topography school while the team started their mobilization back in February 2006. With Rife's son off to college, her husband Bill, a contractor, took on a job in Iraq to be close to her.

SGT Joseph Sullivan, who went into the Aurora Police Academy just weeks after redeploying last November, had just made E5 before heading to Iraq. Sullivan was the information technology specialist on the team. This gave Team 18 plenty of computer knowledge taking into account that Hennessey works for IBM, French is a computer programmer for his family's business, Stephenson works as a contractor for the Peterson help desk and Rife is a manger for Intel in their civilian jobs.

Army Space Support Teams deploy to provide direct Space support to the Corps. That mission remains the same whether the team is comprised of Active, Guard or Reserve Soldiers.

They can all provide support for GPS navigation issues, rapid imagery requests, Blue Force Tracking, satellite architecture,

communications issues and pretty much everything that involves Space.

With emerging technologies, teams are continually providing more and more Space to the warfighter. Their job is to go in and show everyone what they can do. The need for Space is everywhere from the front lines on back, and any way these teams can inject Space into the fight, they will.

This need for Space means the need for more Space Soldiers to provide Space capabilities. This translates to the need for more Reserve Space Soldiers and Teams to supplement the Active and Guard components.

There are currently two Reserve Teams from the 1st Space Battalion deployed in support of Operation Iraqi Freedom. Army Space Support Team 17, which replaced Team 18 in late 2007, and a Commercial Exploitation Team which replaced a Guard team from the 117th earlier this year.

Top - A look from the helicopter as Army Space Support Team 18 flies into Fallujah; *Photo by MAJ John Hennessey;* **Middle** - SSG Yolanda Rife, left, produces a product for MAJ SueAnn Ramsey with the surgeons office; **Bottom** - SGT Joseph Sullivan receives a Bronze Star at an awards ceremony in Iraq. *photos by MSG Dennis Beebe.*

Doctrine Update

https://jdeis.js.mil/jdeis/jel/jel/dftpubs/operations.htm.

By MAJ Patrick O'Brien
and Rich Burks

If ever there was a time for the Space doctrine equivalent of a newspaper boy shouting "Extra, read all about it!" now is that time. Just as we see something new about or from Space every time we turn around, both Joint and service doctrine is being updated and it is worth bringing every Space professional up to speed. Below are recent updates for the JP 3-14, Space Operations, the FM 3-14, Army Space Operations and Space task updates to the FM 7-15, Army Universal Task List.

Before we continue, let us first say a sincere thank you to every one who helped on "The Army Position on the rewrite of JP 3-14." You may have seen it as the Army Position on Space in the last edition of the Army Space Journal (Vol. 6, No. 3). That seminal document had input not only from U.S. Army Space and Missile Defense Command (SMDC) but from Space experts in critical positions throughout the Army. It identified key issues/positions, consolidated justifications for those, and raised awareness on the importance of the Joint Publication and issues that would be decided during the rewrite. As a result, the Army and SMDC were well represented and informed at the first two writing sessions. We truly believe that we produced the beginning of an excellent doctrine document for the Joint community as well as the services. Thanks again!

We would like to solicit your feedback on the new JP 3-14. The First Draft, back from the Joint Staff is dated Jan. 25, 2008. Some major issues that may be of interest include the omission of the term DIRSPACEFOR from all parts of the manual except the Air Force Component narration, the inclusion of the definition of the Space Coordinating Authority as a Joint Position nominated by the Joint Task Force Commander, and the deliberate omission of the term Global Space Coordinating Authority. Many of you voiced concern about these issues and we at Space doctrine were listening. You may download the entire document at: https://jdeis.js.mil/jdeis/jel/jel/dftpubs/operations.htm. Please take a look at the new publication and tell us what you think by e-mailing: space.journal@us.army.mil.

Presented here are a few expansions of some of the issues that you told us were most important as well as the interim results. The first is the Space Coordinating Authority (SCA) which is changed from Coordinating Authority. The Draft JP 3-14 defines and discusses the Space Coordinating Authority as follows: "Although the Space Coordinating Authority role has normally been assigned to the Joint Force Air Component Commander, the Joint Force Commander may designate the Component Commander who has the preponderance of military Space capabilities, expertise, and Space command and control (including reachback)." We at the Space doctrine shop find this is most palatable. The Draft publication goes further with a highlighted vignette that describes a best practice approach of selecting a Space Coordinating Authority: "The designated Space Coordinating Authority should consider, as a best practice, establishing a jointly manned Space element, with appropriate joint authority, to aid the Space Coordinating Authority in the execution of day-to-day responsibilities. Current practice has not yet matured to ensure full representation by all functional components. As an example, the Army and Air Force have provided support to the U.S. Central Command Space Coordinating Authority, creating a level of synergy in Space planning. However, since there is no maritime representation on the Space Coordinating Authority staff, the Space Coordinating Authority provides direct Space support to the lead carrier strike group in theater. The carrier strike group commander requires Direct

https://jdeis.js.mil/jdeis/jel/jel/dftpubs/operations.htm.
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Liaison Authority in order to interact with the Space Coordinating Authority, at the operational level, for support to all tactical level maritime units. A more optimal joint solution is for the Space Coordinating Authority to consider providing functional component Space officers to the staff." Hopefully this definition and vignette serve the purposes of all components and Space professionals for years to come.

For a number of years, there have been articles in Air Force Doctrine Watch that had been calling for the DIRSPACEFOR to be the de-facto Space Coordinating Authority and to have that written into Joint doctrine. Such an idea was not vetted at the first two writing sessions. Indeed, it was the overwhelming opinion of Air Force personnel at those writing sessions that DIRSPACEFOR needed only be mentioned in the Service Component, Air Force section. It resulted that way in the First Draft.

Finally, it is important to mention the issue of including a Global Space Coordinating Authority in the Joint Pub. This idea was discussed at great length and with much vigor in both writing sessions. The final result was achieved with an overwhelming preponderance of opinion falling to the side that there should be no such joint term. Global Space Coordinating Authority is not mentioned anywhere in the Joint Pub 3-14.

Equally as important as the JP 3-14 is the update of the FM 7-15, Army Universal Task List. The older version of FM 7-15, dated August 2003, had one Space task: ART 7.4.6 Provide Space Support. The update is much more robust with respect to what the Army does in Space. There are now sixteen Space and missile defense related tasks. Space tasks are grouped in Chapter 5: The Command and Control Warfighting Function, under Section VI: Integrate Space Operations. The Missile Defense tasks are grouped under Chapter 6: The Protection Warfighting Function, in Section I: Employ Air and Missile Defense. These changes have been approved by U.S. Training and Doctrine Command's Combat Arms Doctrine Directorate at Fort Leavenworth, Kan. Currently the 1st Space Brigade S-3 shop is working feverishly to better define the measures of success for ART 5.6.4, Provide Space Situational Awareness. All tasks are listed in table 1

Table 1

Army Task	Title
ART 5.1.1.6	Integrate Space Capabilities
ART 5.6	Integrate Space Operations
ART 5.6.1	Provide Space Force Enhancement
ART 5.6.1.1	Provide Space Based Position, Navigation, and Timing Support
ART 5.6.1.2	Provide Reconnaissance and Surveillance Support
ART 5.6.1.3	Provide Satellite Communications Support
ART 5.6.1.4	Provide Weather and Environmental Monitoring Support
ART 5.6.1.5	Provide Theater Ballistic Missile Warning Support
ART 5.6.2	Provide Space Control
ART 5.6.3	Provide Army Space Support
ART 5.6.4	Provide Space Situational Awareness
ART 5.6.5	Coordinate Army Space Capabilities
ART 6.1.5	Plan Ballistic Missile Defense
ART 6.1.6	Conduct Ballistic Missile Defense
ART 6.1.6.1	Manage System Configuration
ART 6.5.7	Protect Critical Facilities and Systems

In the past few weeks, FM 3-14 has popped up as a 50 meter target in Space doctrine's lane. This is, of course, necessitated by the release of the first draft of JP 3-14 and our recent release of FM 3-14.10, Space Brigade Operations. With such extensive changes occurring not only in the Joint doctrine, but in our own service doctrine, we need to update to stay in tune. We are currently working the Program Directive for that FM update. If you have anything you'd like to see in the new FM 3-14, please write to the Army Space Journal and we'll ensure that your issues are carefully considered in the upcoming rewrite. There is a lot of new ground to cover such as Space Cadre activity, warfighter lessons learned, expanded Space missions, to mention a few.

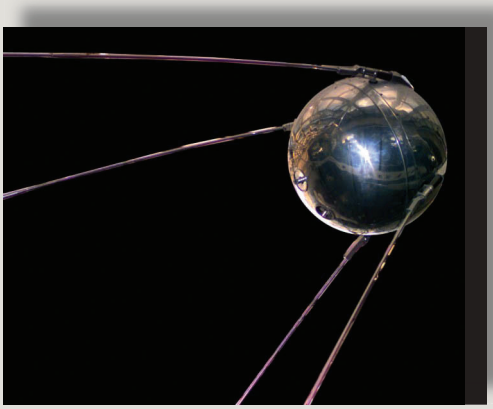
We are fond of saying: "Doctrine is the ground truth." However, we are very cognizant of the fact that you fine people hold the ground that we write about. We are dependent on you for quality input. Don't let us down.

MAJ Patrick O'Brien is an FA40 assigned to the Future Warfare Center's Directorate of Combat Development in Colorado Springs, Colo.

Rich Burks is the Chief of Doctrine for U.S. Army Space and Missile Defense Command and the Managing Editor of the Army Space Journal. E-mail the authors at: space.journal@us.army.mil

Sputnik Shocks the United States Into Action

By Mark Hubbs,
SMDC/ARSTRAT Historical Office



Sputnik (Russian for "Traveling Companion") was a 184 pound aluminum satellite 23 inches in diameter. It had a radio transmitter and four antennas which broadcast a clear series of "beeps" to the earth's surface.

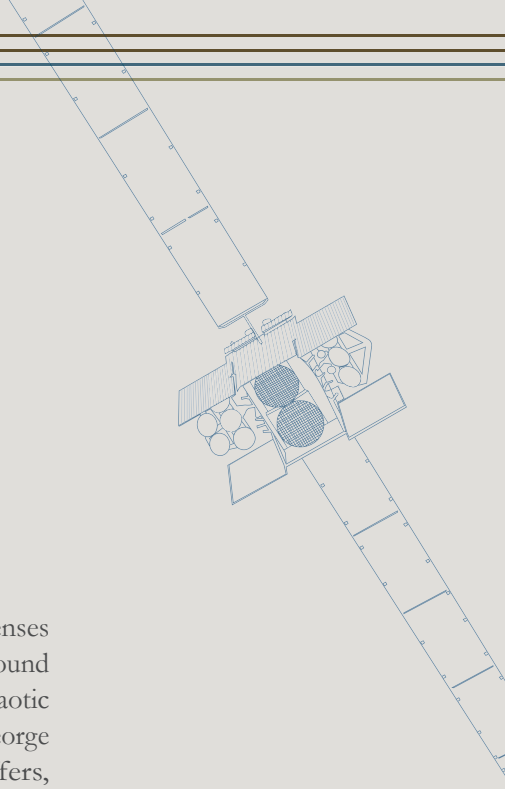
Although Oct. 4 is seldom recognized as a significant day in history by most people, the events of that day in 1957 forever altered the course of Soviet and American history. On that day, the Soviet Union surprised the world with the launch of the first "artificial moon" or satellite. Sputnik (Russian for "Traveling Companion") was a 184 pound aluminum satellite 23 inches in diameter. It had a radio transmitter and four antennas which broadcast a clear series of "beeps" to the Earth's surface. John Gibson, who was a 2nd Lt. posted to Redstone Arsenal, was assigned the duty of monitoring Sputnik's orbits and transmissions. The satellite was at an altitude of 560 miles and was making an elliptical orbit every 96 minutes. Gibson noted that it had "two radio transmitters on wavelengths of 7.5 and 15 meters … sending a continuously alternating or telegraph like signal with pulses being about 0.3 seconds apart."

The Russian satellite program and its American counterpart grew out of the International Geophysical Year 1957-1958 (IGY). The IGY was conceived by the International Council on Scientific Unions in 1952 and was intended to provide an internationally coordinated series of observations of various geophysical phenomena. Although 67 countries eventually became involved with the IGY, only the Soviet Union and the United States committed to developing artificial satellites as part of the program.

The Sputnik radio transmission served only one purpose, to broadcast Soviet success and to prove to the world that the satellite was indeed in orbit. Sputnik's career was short — it fell back to Earth only three months after it was launched. Despite its short life and limited ability, its affect on the world was immediate and long lasting.

Although the United States had been developing it own satellite, it was unaware that the Soviets had achieved so much, so soon in their own research. The Soviet technical achievement caught the world's attention and the American public completely off guard. Congressional and public outcry resulted with the correct perception that the Soviets had surpassed the United States scientifically.

Before the shock of Sputnik subsided, the Soviets launched Sputnik II on Nov. 3. At 1100 pounds, this satellite was six times the size of Sputnik I and carried "Laika" a small dog, the first living creature to go into Space. Laika survived the launch but perished when his oxygen supply was exhausted and the little dog became a martyr for the Soviet Space program. The Soviets touted



Sputnik II (or "Muttnik" as it was called in the American press) as a great achievement because none of its engineering tasks for this larger satellite had been started until after the launch of Sputnik I.

The continued success of the Sputnik program further inflamed public opinion on the government's lack of a Space program. Some scientists also suggested that the Soviet's ability to place an object in orbit translated to an ability to accurately target the United States and Europe with nuclear tipped Intercontinental Ballistic Missiles. The Sputnik surprise reinforced some pundits' contention that President Dwight D. Eisenhower was a golf playing incompetent who was mismanaging America's technological potential. G. Mennen Williams the Governor of Michigan wrote a poem about the Sputnik crisis:

Oh little Sputnik, flying so high
With made-in-Moscow beep
You tell the world it's a Commie sky
And Uncle Sam's asleep!

You say on fairway and on rough The Kremlin knows it all, We hope our golfer knows enough To get us on the ball.

Senate Majority Leader Lyndon B. Johnson recalled of Oct. 4, 1957: "Now, somehow, in some new way, the sky seemed almost alien. I also remember the profound shock of realizing that it might be possible for another nation to achieve technological superiority over this great country of ours." As a result of Sputnik, Johnson opened hearings of the Senate Armed Services Committee in late November 1957 to review the entire scope of American missile defenses and the Space program. The Committee found serious underfunding, redundancy and chaotic organization in America's Space efforts. George Reedy's, one of Johnson's Senate staffers, comments were typical of most Americans: "the simple fact is that we can no longer consider the Russians to be behind us in technology. It took them four years to catch up to our atomic bomb and nine months to catch up to our hydrogen bomb. Now we are trying to catch up to their satellite."

Although the White House had announced plans to place a satellite into orbit as early as July 1955, these efforts had received no serious attention or funding. After reviewing several proposals, the Navy's Vanguard program had been chosen over the Army's Explorer project based at Redstone Arsenal under Wernher von Braun. This changed after Sputnik when the Defense Department responded to the political storm and concurrently funded the Army's program.

Vanguard exploded on the launch pad on Dec. 6, 1957, much to the embarrassment of the Navy and the Defense Department. However, von Braun's Army team did what the Navy could not. With only about six weeks of preparation time, the Army's Explorer I lifted off the launch pad on top of a Jupiter C rocket from Cape Canaveral on Jan. 31, 1958. The United States Army had put America into Space for the first time, and Redstone Arsenal would forever be changed as it became the center of Army, and later NASA, rocket and missile technology development.

This article was taken from multiple sources contained in the Office of the Command Historian, U.S. Army Aviation and Missile Command.

Explo

"Jupiter-C Puts Up Moon": Launches Army's Space Mission

The three men responsible for the success of Explorer I, America's first Earth satellite, which was launched January 31, 1958, are from left to right, Dr. William H. Pickering, former director of the Jet Propulsion Laboratory, Dr. James A. van Allen, of the State University of Iowa, and Dr. Wernher von Braun, leader of the Army's Redstone Arsenal Team.

The story of Explorer I, the free world's first artificial satellite, goes beyond the traditional story of the Army team at Redstone Arsenal responding to the Soviet Union's launch of the Sputnik 1 on Oct. 4, 1957. To truly understand the remarkable accomplishment made by the men and women of the greater Huntsville/Madison County community, we need to step back in time a bit further than 1957.

On Sept. 15, 1954, the Army Ordnance Missile Laboratories at Redstone Arsenal published the first true engineered thesis for a minimum satellite vehicle utilizing existing Army Ordnance Corps hardware. Written by Dr. Wernher von Braun, the thesis proposed using the REDSTONE missile as the main booster of a four-stage rocket for launching artificial satellites. The plan was later expanded into a joint Army-Navy proposal called Project Orbiter and submitted to the Assistant Secretary of Defense on January 20, 1955. However, five days later, President Dwight D. Eisenhower officially sanctioned another artificial earth satellite undertaking, the U.S. Navy's Project Vanguard, for the United States' contribution to the International Geophysical Year.

As early as April 1956, the Army advised the Department of Defense that its JUPITER-C missile could orbit a satellite by the end of the calendar year as an alternate to Vanguard. In May 1956, however, the Defense Department informed the Army that it was not to initiate any plans or preparations for using any part of the JUPITER or REDSTONE programs as the basis for an orbital launch vehicle.

As part of its reentry test vehicle program, the Army at Redstone flight tested a staged REDSTONE missile on Sept. 20, 1956, that could have orbited the world's first satellite if permission had been granted to do so. Having proved that it had the necessary capability, the Army continued to offer its potential to launch a satellite as a backup to the Vanguard program, but again it was ordered to refrain from any efforts in this area.

Dr. Ernst Stuhlinger, an original member of von Braun's team, revealed in a speech in July 1957 at the Army Science Symposium at the United States Military Academy, West

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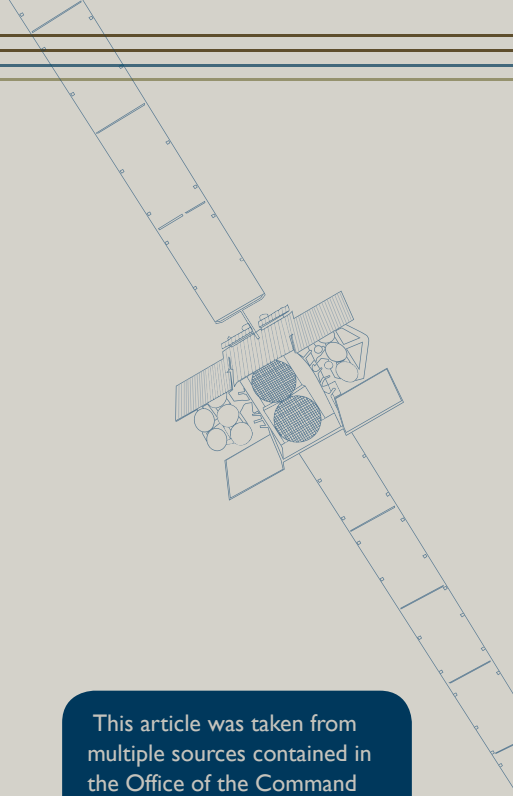
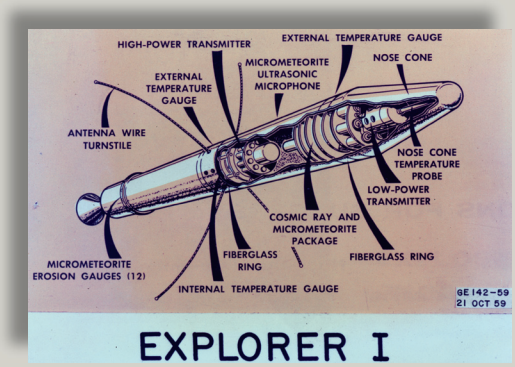


Point, N.Y., that practically all components necessary for a successful satellite launch were available at Redstone Arsenal's Army Ballistic Missile Agency. These components, he said, were left from Project Orbiter. Instead, the Defense Department reaffirmed its close cooperation with Project Vanguard and denied that any of its research programs interfered with the intended tactical uses of the REDSTONE missile. As noted earlier, the Soviet Union launched Sputnik I, the world's first satellite, on Oct. 4, 1957. A month later, they orbited a second, larger satellite, Sputnik II, on Nov. 3, 1957. Five days later, on Nov. 8, 1957, the Secretary of Defense, Neil McElory, directed the Department of the Army (and specifically the Army at Redstone Arsenal) to modify two JUPITER-C missiles and to attempt to place an artificial earth satellite in orbit by March 1958. The Navy made a last-ditch effort to launch their Vanguard. Project Vanguard faltered when it exploded on the launch pad on Dec. 6, 1957.

On Jan. 31, 1958, just 84 days after receiving the mission, the Army Ballistic Missile Agency launched the first U.S. satellite — Explorer I — into orbit. With the successful launch of Explorer I, the Army embarked on an ambitious program which rapidly advanced U.S. interests and goals in the Space arena. For example, the Army Ballistic Missile Agency placed additional Explorer satellites into orbit on March 26, 1958, July 26, 1958 and Oct. 13, 1959. Also, on March 3,1959 Pioneer IV, a joint Army Ballistic Missile Agency/Jet Propulsion Laboratory project under the direction of the National Aeronautics and Space Administration (NASA), achieved a velocity in excess of 24,560 miles per hour; passed within approximately 36,000 miles of the Moon; and traveled on to become the first U.S. satellite in permanent orbit around the Sun. And, the flight of monkeys Able and Baker on May 28, 1959, marked the first successful recovery of living beings after their return to earth from outer Space. Their survival of speeds over 10,000 miles per hour was the first step toward putting a man into Space



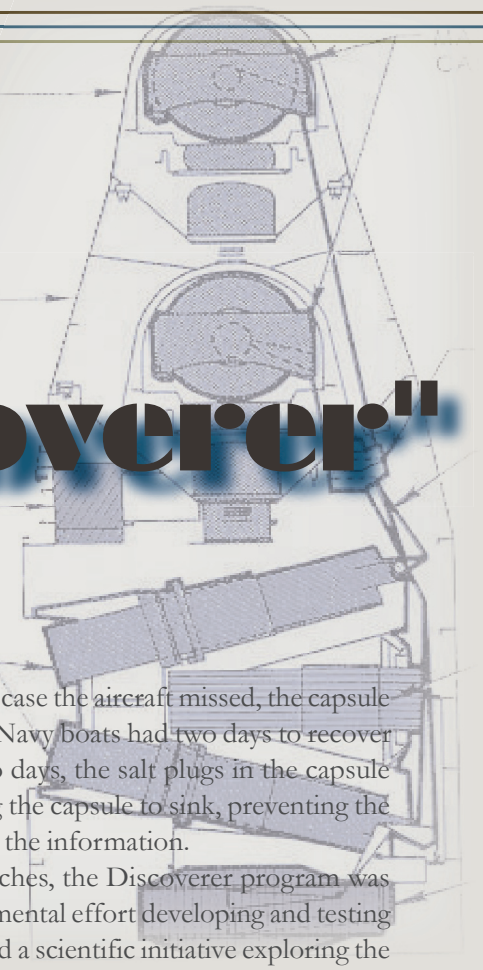
THIS CUT AWAY GRAPHIC ILLUSTRATES THE UNUSUAL DESIGN OF THE EXPLORER I SATELLITE AND ITS SCIENTIFIC EQUIPMENT. THE EXPLORER I CARRIED THE RADIATION DETECTION EXPERIMENT DESIGNED BY DR. JAMES VAN ALLEN AND DISCOVERED THE VAN ALLEN RADIATION BELT.

On July 1, 1960, the Army at Redstone formally lost all of its Space-related missions, along with about 4,700 civilian employees (including the Von Braun team) and $100 million worth of buildings and equipment at Redstone Arsenal and Cape Canaveral to NASA's George C. Marshall Space Flight Center. At the activation ceremonies, von Braun, the new Director of the Center, remarked that "without the bountiful and courageous backing and support of the Army … the free world would not jumped off into Space nearly so soon."

This article was taken from multiple sources contained in the Office of the Command Historian, U.S. Army Aviation and Missile Command.

Corona Codename "Discoverer"

America's First Space Surveillance Satellite



In February 1995, President William Clinton signed an Executive Order declassifying early satellite imagery. The release of over 860,000 photos, taken between 1960 and 1972, has helped scientists explore ancient habitation sites and track environmental changes. But it also provided an insight into the early Cold War.

In the 1950s, the United States was making great advances in weapons technology, but the Soviet Union also saw significant gains. In 1953, the Soviets became a nuclear power. Two years later they unveiled a long range bomber and the intercontinental ballistic missile followed soon thereafter. As the press explored the bomber and later the missile gaps, there was a need to define the threat to the nation. As Admiral William O. Studeman, Acting Director of Central Intelligence, observed in 1995, "CORONA was conceived in … an era when facts were scarce and fears were rampant."

The concept of using an Earth orbiting satellite for reconnaissance was initiated as early as 1946 in a memorandum by the RAND Think Tank. When overtures to the Soviet Union, such as the Open Skies Policy, were rejected, President Dwight Eisenhower approved the project in February 1958. The Corona Project was incorporated into an existing Air Force Weapon System 117L — the Discoverer program.[1]

Project Corona was a highly classified satellite reconnaissance program developed and tested under the codename Discoverer. Equipped with a panoramic camera, the Corona would fly over and photograph Soviet Bloc countries. The exposed film would be transferred to recovery vehicles and de-orbited for mid air or ocean recovery. With a parachute slowing the descent, the capsule or "bucket" was captured by an Air Force C-119. In case the aircraft missed, the capsule was designed to float. Navy boats had two days to recover the buckets. After two days, the salt plugs in the capsule would dissolve causing the capsule to sink, preventing the enemy from capturing the information.

With 38 public launches, the Discoverer program was described as an experimental effort developing and testing satellite subsystems and a scientific initiative exploring the environmental conditions in Space.[2] It achieved a number of breakthroughs. Discoverer I, launched Feb. 28, 1959, was the first polar orbiting satellite. Discoverer II, launched April 13, 1959, was the first satellite to be stabilized in orbit in all three axes to be maneuvered on command from earth, to separate a reentry vehicle on command, and to send its reentry vehicle back to earth.[3]

The next major accomplishments for Discoverer/Corona came in August 1960. Launched from Vandenberg Air Force Base, Calif., atop a Thor-Agena rocket, the Discoverer XIII completed 17 orbits of the Earth. On Aug. 10, 1960, the capsule became the first manmade object recovered from an orbiting satellite. An American flag flown in Space aboard the capsule was later presented to President Eisenhower in a ceremony at the Oval Office. Eight days later, the Air Force achieved a mid-air recovery of the Discoverer XIV capsule and its 20-pounds of film.[4] Flight XIV covered over 1,650,000 square miles of Soviet Territory more than all of the earlier U-2 missions combined. The age of satellite reconnaissance had begun.

Although the Discoverer program ended on Feb. 27, 1962, Corona continued for another 10 years under the newly created National Reconnaissance Office. The primary collection targets were Intercontinental Ballistic Missiles, Intermediate Range Ballistic Missiles, sub-launched missiles, heavy bombers and nuclear energy. The first target was Mys Schmidta, a Soviet air base, on the Chukchi Sea in

far northeastern Russia. As technology evolved, resolutions improved to six to 10 feet, for example, showing a parking lot at the Kremlin or locating missile silos.

The Corona payload began as a single panoramic camera with a resolution of 35-40 feet. Later flights carried two panoramic cameras and by the mid 1960s, they could take stereo photographs by tilting the cameras fore and aft as they passed over a particular site. This innovation allowed cartographers, creating maps from the data, to determine terrain relief.[5]

The use of film in Space produced some initial technical problems. Some flights experienced "mysterious fogging and bright streaks on the film." Studies concluded that electrostatic discharges, now called corona discharges, from the camera's rubber components had exposed the film. Grounding of the equipment and outgassing testing of the parts resolved this issue. Other problems (tearing and jamming) with acetate based film used in early missions, were addressed by Eastman Kodak. Kodak developed a new polyester based film (mylar) coated with high resolution emulsion which could withstand Space operations. Later versions of the 70mm film were thinner allowing the system to carry more film thereby increasing the length of the missions up to 19 days.

It was of utmost importance to protect this project as the satellite's cameras would only be able to discern objects 50 to 100 feet on a side. This being the case, it would be easy for the Soviets, if they discovered the project and its capabilities, to build dummies able to fool the cameras.

Officials terminated the Corona project on May 31, 1972. According to one source, this decision was made after a Soviet submarine was detected in a Corona mid-air retrieval zone. After 13 years and 145 missions, the Corona project had:

- Imaged all Soviet medium-range, intermediate-range and Intercontinental Ballistic Missile complexes
- Imaged each Soviet submarine class from deployment to operational cases
- Provided inventories of Soviet bombers and fighters
- Revealed the presence of Soviet missiles in Egypt protecting the Suez Canal
- Identified Soviet nuclear assistance to the People's Republic of China
- Monitored the SALT I Treaty
- Uncovered the Soviet Anti-ballistic Missile program and sites (GALOSH, HEN HOUSE, etc.)
- Identified Soviet atomic weapon storage installations
- Identified People's Republic of China missile launching sites
- Determined precise locations of Soviet air defense missile batteries.
- Observed construction and deployment of the Soviet ocean surface fleet
- Identified Soviet command and control installations and networks
- Provided mapping for Strategic Air Command targeting and bomber routes
- Identified the Plesetsk Missile Test Range, north of Moscow.

As Admiral Studeman observed, "Such pictures held enormous significance for the course of the Cold War. They provided information that allowed our leaders to weigh the Soviet threat and measure our response. CORONA debunked the "missile gap" argument. [And,] it allowed us to base our national security strategy — and spending — on facts rather than fear, on information rather than imagination.

The Corona program achieved a number of firsts in its 13-year history. It was the first photo reconnaissance satellite in the world, the first to achieve a mid-air recovery of a vehicle returning from Space, and the first to eject and recover multiple vehicles from Space. The Corona images, the first stereo optical data from Space, also represent the first mapping of Earth from Space. Finally, the Corona was the first reconnaissance program to fly 100 missions. The Corona holds a significant place in our national history. A role that is recognized at the Smithsonian, which has a corona camera and the recovery buckets from the last mission on display.

[1]WS 117L/Discoverer also included the Satellite and Missile Observation System (SAMOS), a more rugged photo reconnaissance satellite which would transmit the images electronically, and the Missile Defense Alarm System (MIDAS), which would use an infrared sensor to detect foreign launches. Both programs achieved some success but were subsequently canceled.

[2]In keeping with this, some of the Discoverer missions carried experimental payloads in addition to or instead of the reconnaissance equipment.

[3] Ice Station Zebra, by Alistair MacLean, is apparently based upon news accounts of the search for Discoverer II. A timing error caused the capsule to be ejected early near Spitsbergen in northern Norway rather than the Pacific Ocean. It is believed that Soviet agents recovered the prototype capsule which was not fitted with a camera.

[4]Note the first satellite photos of Earth were actually taken on 14 August 1959 by Explorer 6.

[5]Corona data had many other uses, e.g. to assess military strength and to estimate grain production.

Tip of the Sphere

Space Professional Personnel Update

BY LTC CHRISTOPHER LIVINGSTONE

LTC Christopher Livingstone is an FA40 Space Operations Officer dual-hatted as the Chief, FA40 Personnel Proponent Office and Chief, Army Space Cadre Office. Livingstone previously served with the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command in the 1st Space Battalion. He also served as an Ordnance Office in the 1st Infantry Division, 1st Armor Division, 1st Cavalry Division, and First U.S. Army prior to entering the Space Operations Career Field in 2003. PH: (719) 554-8753; Fax 8764; DSN 692.

New Office Location

This past summer, the FA40 Personnel Proponent Office (PPO) officially relocated and is now based in Colorado Springs, Colo. In September 2007, SMDC/ARSTRAT also established the Army Space Cadre Office (ASCO) in Colorado Springs. As stated in previous articles of the **Army Space Journal**, the Army Space Cadre is made up of both Space Professionals and Space Enablers. Both offices are currently staffed with three personnel each under the direct supervision of LTC Christopher Livingstone. The FA40 PPO and ASCO have distinct and separate missionsThe mission of the PPO is to execute life-cycle management functions for FA40 Space Professionals while the ASCO's mission is to identify Army Space Cadre members, track positions, personnel and training data, and report data and metrics in accordance with Congressional/Department of Defense directives

The FA40 Space Operations e-mail address remains the same. For communication with the FA40 PPO (FA40-Space@smdc.army.mil). Mailing addresses, office symbols, fax numbers, and POCs for both Colorado Springs offices are as follows:

FA40 PPO

SMDC/ARSTRAT
FA40 Personnel Proponent Office
ATTN: SMDC-OPZ-FA
350 Vandenberg Street
Peterson Air Force Base, CO 80914
POCs: Kevin Janes and John Nelson
(719) 554-2147 / 2148; Fax 8764; DSN 692
Patsy Campbell: (703) 254-4419

ASCO

SMDC/ARSTRAT
Army Space Cadre Office
ATTN: SMDC-OPZ-FB
350 Vandenberg Street
Peterson Air Force Base, CO 80914
POCs: Greg Piper and Jim Schlichting
(719) 554-1970 / 8705;
Fax 8764; DSN 692

Army Space Cadre

The Army Space Cadre Office under the direction of LTC Christopher Livingstone achieved initial operational capability in Sept. 2007. The office is responsible for the identification, tracking and reporting of all Space Cadre personnel, to include Space Professionals (currently FA40s only) and Space Enablers:

Space Professionals (military and civilian)

— Career Space specialists whose principle duties include planning, developing, resourcing, acquiring, integrating or operating Space forces, concepts, applications or capabilities.

Space Enablers (military and civilian)

— Personnel whose primary career field is not in Space but perform unique tasks or functions or may require skills to apply Space capabilities.

On Aug. 21, 2007, the Senior Army Space Council approved A750 Space Enabler billets which were identified in accordance with the Space Enabler Nomination and Selection Effort (SENSE) guidelines. The council directed a supplemental data call to identify additional billets from units that made few or no nominations in the initial effort, and to standardize Space Enabler positions across the Army's force structure. The ASCO is currently working the supplemental data call and will submit the results to the Senior Army Space Council for approval in 2nd quarter, Fiscal Year 2008. All approved billets will be entered into a database that will eventually include information such as education, training and experience requirements. The next step in the process is to identify individuals currently assigned to the approved billets as either Space Professionals or Space Enablers and to update the database with their unique Space experience.

Promotions

2007 Selection Boards recognized the following FA40s for promotion:

Aug. 23: MAJ Promotion List — Congratulations to our FA40s selected for promotion to MAJ: CPT Wade Birdwell, CPT Glen Hees, CPT Jeffrey Kacala, CPT Neil Macleod, CPT Christopher Ortiona, CPT Matthew Schreiber, CPT Bryan Shrank, CPT William Starr, CPT William Symolon and CPT Christopher Turner.

July 31: LTC Promotion List — Congratulations to our FA40s selected for promotion to LTC: MAJ Brent Campbell, MAJ Scott Gensler, MAJ Jackie Patten, MAJ Patrick Mullin, MAJ Chauncy Nash, MAJ Shelley Volkwein, MAJ Pete Wirth and MAJ Frank Wright.

Nov. 27: COL Promotion List — Congratulations to our FA40s selected for promotion to COL: LTC Lee Gizzi, LTC Eric Henderson and LTC Bill Whitney.

Education/Training

The FA40 PPO is currently working with the Air Force National Security Space Institute and their Army FA40 representative (LTC Rich Wolfe) to develop online Space Fundamentals training. Also, an annual training conference is scheduled for 3rd quarter Fiscal Year 2008. Look for more information regarding both topics in the next **Army Space Journal**.

Senior Service College

Congratulations to our FA40s selected for the Senior Service College: COL Todd Day, LTC Rick Dow, LTC Lee Gizzi, LTC Tom James, LTC Jim Meisinger, and LTC Don Wilkerson (now attending).

TIP OF THE SPHERE

News from the Assignment Desk

BY MAJ ED ANDERSON, CAREER FIELD MANAGER

MAJ Ed Anderson started his FA40 career in the Cheyenne Mountain Operations Center as a Missile Warning Center Deputy Commander in the Summer 2001. He was officially designated an FA40 in December 2004 and attended the Space Operations Officer Qualification Course in the Fall 2005. Following the course, Anderson was assigned to the 1st Space Brigade as a Space Control Planner where he served until assigned as the FA40 Career Manager in Summer 2007.

New to the FA40 Community

The FA40 ranks continue to grow with 26 new FA40s in 2007. Eleven officers were designated FA40 from the 2007 Functional Designation Board while the remainder came from Branch Transfers, Inter-Service Transfers from the Air Force, and Call to Active Duty.

Congratulations and a warm welcome to the 2007 cohort of Captains selected for Fiscal Year 2008 accession to FA40: CPT Mark A. Cobos, CPT James T. Edwards, CPT William A. Hamilton, CPT Elizabeth J. Helland, CPT Michael P. McGaffigan, CPT Jason I. Needler, CPT Kenneth C. Nickerson, CPT Steven M. Paulk, CPT Matthew O. Reynolds, CPT Jeffrey N. Roberts, and CPT Ian P. Sein.

Welcome aboard to the following Soldiers who Branch Transferred and officially became FA40s in 2007: CPT Tammy L. Aguilar, CPT Todd A. Book, CPT Jason P. Nunnery MAJ Timothy S Bean, MAJ Brian C. Bolio, MAJ Courtney L. Henderson, MAJ Jamica J. Powell, and MAJ James L. Smallwood.

Welcome to the following BLUE to GREEN arrivals to the FA40 community: CPT Brian R. Barnes, MAJ Cooper D. Bowden, MAJ Sean M. Lavigne, MAJ David A. Settje, and MAJ Troy H. Wincapaw.

And last but not least, welcome to the following Soldiers Called to Active Duty in 2007: MAJ Todd M. Leitschuh and MAJ Eric D. Little.

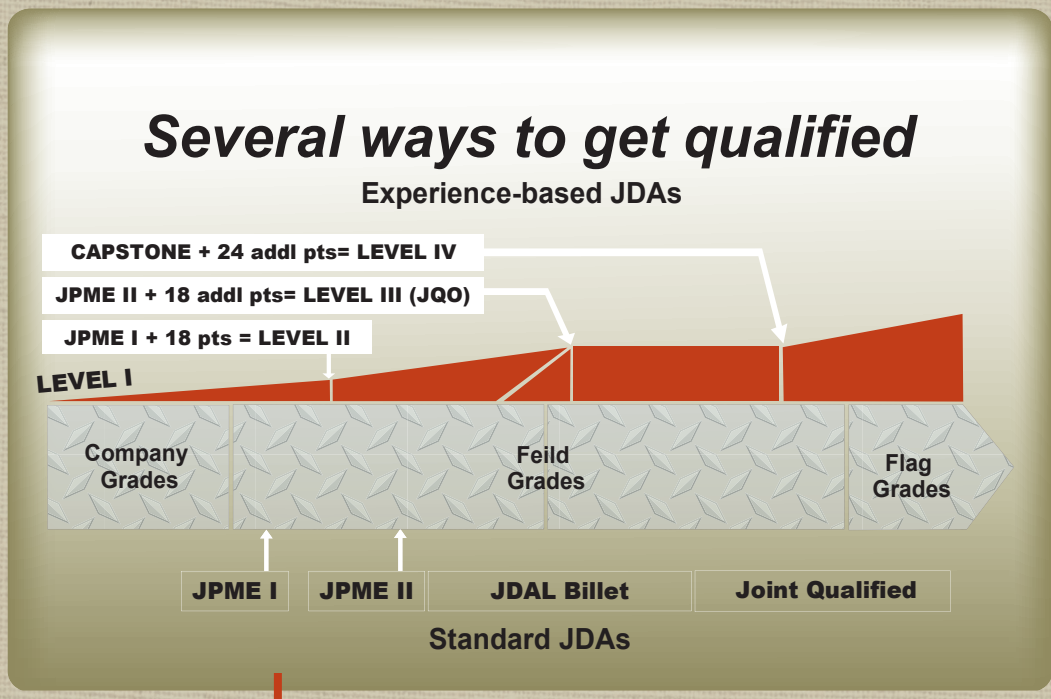
If you know of someone who wants to become an FA40, have them contact the FA40 PPO or MAJ Anderson at the FA40 Assignments Desk for assistance.

FA40 Assignments Desk

FA40 Career Field Manager
AHRC-OPB-K (ATTN: FA40)
Hoffman I (Rm 508)
200 Stovall Street
Alexandria, VA 22332
POC: MAJ Ed Anderson
(703) 325-0748; Fax 5668; DSN 221

Advanced Civil Schooling/Training with Industry (ACS/TWI)

The Advanced Civil Schooling/Training with Industry selection board was held in October 2007 to choose four FA40s for Advances Civil Schooling and two for Training with Industry. Army leaders endorse the value for all officers to pursue a Masters Degree as part of their professional development and has taken action to offer more to basic branches. The FA40 Personnel Proponent Office and I continue to work to expand opportunities for the FA40 community.



Joint Qualification System

FA40s are encouraged to learn more about the changes in the Joint Qualification System and apply for credit. Some information is provided below. For additional information, please visit the FA40 Human Resources Command Web site (https://www.hrc.army.mil/site/protect/Active/opfamio/FA_40/fa40.htm).

The new Joint Qualification System attempts to capture joint experiences and award levels of Joint Qualification as early as Officer Basic Course graduation.

The previous system of Joint Duty Assignment List billets continues to be the primary avenue for Joint Qualification; however, the new Joint Qualification System seeks to give officers credit for joint experiences in non-Joint Duty Assignment List billets. Accrual of qualification points has experience criteria which includes joint experiences, joint training, joint exercises, and other education (details TBA).

From Oct. 1, 2007 — Sept. 30, 2010, officers can self-nominate non-Joint Duty Assignment List Joint experiences since Sept. 11, 2001. Human Resources Command Career Managers, such as myself, will validate the experiences and a Joint Staff Special Review Panel will validate and award points. The first Special Review Panel is scheduled for Feb. 25-29, 2008; target population TBD.

Point Accrual Formula

JOINT QUALIFICATION LEVEL comes from **JOINT EDUCATION** + **EXPERIENCE Pts** + **DISCRETIONARY** Pts

EXPERIENCE Points = Duration (Months) x Environment Factor*
*Combat: 3, Non-Combat: 2, Steady-state: 1

DISCRETIONARY Points = Training + Exercise
Training = degree or certification related to "Joint Matters" [Pts TBD]
Exercise Points = Role [Participant (1pt), Planner (2pts), Leader (3pts)]

Process for Getting E-JDA Credit

1. Self nomination Web site:
   -https://www.dmdc.osd.mil/jqs/
2. Self nomination checklist and supporting documentation to Career Manager
   -available on Joint Policy Web site
3. Career manager validates experiences actually happened, documentation supports
4. Deliver packet (hard copy) to Joint Policy
5. Joint Staff board validates experience meets “Joint Matters” definition
6. Feedback (TOPMIS/AKO/Board memo)

Training Insights

BY LARRY MIZE

Larry Mize graduated from Xavier University with a Bachelor of Science in Mathematics in 1973. He entered active service in the United States Navy serving a career specializing in Naval Intelligence, Aircraft Carrier Operations, Naval Special Warfare (SEALs), and Space Operations. He attended French language training at the Defense Language Institute and subsequently served as the U.S. Navy Liaison Officer to the Commander French Forces Indian Ocean/French Foreign Legion/Commandos Marine in Djibouti. He attended the Naval Postgraduate School and was awarded a Master of Science in Space Systems in 1986, subsequently serving at U.S. Space Command and U.S. Strategic Command. Mize is currently Chief of Space and Ground-based Midcourse Defense Education and Training.

2008 SOOQC Schedule

- SOOQC 08-01 June 9 – Aug. 15, 2008
- SOOQC 08-02 Sept. 15 – Nov. 21, 2008

Contact: Larry Mize, SMDC FWC DCD Chief of Training at: larry.mize@smdc-cs.army.mil (719) 554-4545 for more information.

Janice B. Williams Joins FWC DCD Training Team

In July 2007, Janice Williams joined the Training Team in Colorado Springs. Williams comes to the Team from the Futures Warfare Center Battle Lab and brings a career of invaluable experience balanced with a welcomed positive personal and professional attitude and top-notch interpersonal skills. A team player from the start, Janice is responsible for all aspects of student support, registrar duties, courses administration and security. Only on the job a few months and in tribute to her contributions, the graduating class of SOOQC 07-02 honored Janice for her key support by presenting her an engraved plague and gift card. Contact Janice at: 719 554-0422 or janice.b.williams@smdc-cs.army.mil

Proponency for Joint Tactical Ground Station (JTAGS) Operator Initial Qualification Training Transitioning

On May 1, 2008 the responsibility for training execution, development, and accreditation of the Joint Tactical Ground Station (JTAGS) Operator Initial Qualification Training course will transfer from the 1st Space Brigade to Future Warfare Center, Directorate of Combat Development. The course provides training for operators on the capabilities and operations of JTAGS, to include major components, controls and indicators; and missile event processing. The training is an intensive seven weeks, mostly hands-on, taught six times a year. This course awards an Additional Skill Identifier of Q4 but no Military Occupational Specialty. Training takes place in Colorado Springs, Colorado. POC: Michael Hersh, 719 554-4546 or michael.hersh@smdc-cs.army.mil

Space Operations Officer Qualification Course 07-02

FRONT ROW: LTC Timothy L. Rahn, MAJ Thomas B. Ransom, MAJ Thomas S. Pugsley, MAJ Aaron B. Luck, MAJ Corey Gerving, MAJ Tad Hervas. Second Row: CPT Janet L. Schoenberg, MAJ Luke E. Koerschner, MAJ Brian P. Gary, MAJ Glen R. Hees, MAJ Douglas, M. Ross, MAJ Louis D. Lancon, 1LT Christopher J. Chojnacki, MAJ Michael S. Hatfield. Third Row: MAJ Courtney L. Henderson, MAJ Eric D. Little, MAJ William C. Riley, SSG Glenn E. Shockley. Fourth Row: MAJ Todd M. Leitschuh, MAJ Sean M. Lavigne, MAJ Jennifer Adams-Buckhouse, MAJ Steven D. Moseley, MAJ James L. Smallwood, CPT Christopher L. Fairley. Back Row: MAJ Brad E. Rhodes, MAJ Michael H. Rittenhouse. Not pictured: MAJ John A. Moberly

MDA and FWC Reach Agreement on GMD Operator Course Transition

The SMDC Future Warfare Center Directorate of Combat Development and the Missile Defense Agency Ground-based Midcourse Defense (GMD) Program Office reached agreement in February 2008 on the transition of the GMD Operators Course to the Army. The course is one of five courses taught at the Missile Defense Agency's GMD Training and Exercise Center in Colorado Springs, Colo. Army operators from the 100th Missile Defense Brigade and the 49th Missile Defense Battalion have been attending the nine-week course since 2003 to qualify as GMD operators. The Directorate of Combat Development will provide a Contracting Officer's Representative to the GMD Training and Exercise Center starting in February 2008. He will be responsible for the GMD Operator Course. Army GMD Operators receive a unique additional skill identifier (ASI T3) following completion of the Operator Course. The Directorate of Combat Development views this first limited transition step as the road to complete transition tied to future Program Objective Memorandum cycles.

Space Operations Officer Qualification Course 07-01

FROM LEFT TO RIGHT: CPT Neil Maclead, 1LT Sean Burke, MAJ Donald L. Thomsen III, LTC Ralph Smith Siegrist III, CPT James Innes, MAJ Jason Kalainoff, MAJ Christopher Oxendine, CPT Steven Hady, CPT Eric Marion, CPT Michael Bancroft, MAJ Martin Lally, CPT Chad Davis, MAJ Jeffery Douds, CPT Shawn Geib, CPT Matthew Schreiber, MAJ Lawrence Fields, BG Roger F. Mathews, 1LT Angela Monday, MAJ Rodney Fischer, CPT Charles Hayes, MAJ William Eldridge, CPT John Marley, Not Pictured: MAJ Jeffery McBroom, CPT Neia Powell, CPT David Weising, MAJ Randy Wheeler, CPT John Yungbluth.

FWC DCD Developing Qualification Course for Army AN/TPY-2 Forward Based Mode (FBM) Sensor Managers

The Training Division of the FWC Directorate of Combat Development has been working since December 2006 to develop a qualification course for Army AN/TPY-2 (FBM) sensor managers. The Army was named lead service for the AN/TPY-2 (FBM) in February 2006 and the 94th Army Air and Missile Defense Command in Hawaii has been assigned the first sensor management mission to control the first deployed AN/TPY-2 (FBM) at Shiriki, Japan. Due to the late assignment of this mission to the Army and 94th Army Air and Missile Defense Command, initial training was largely done using on-the-job training, exercises and off-the-shelf courses. The Directorate of Combat Development is applying Training and Doctrine Command training standards and processes to build a course to meet future sensor manager training requirements based on their critical warfighting tasks. These tasks were identified at a Critical Task Selection Board in February 2007 and approved by U.S. Army Space and Missile Defense Command Deputy Commanding General Roger F. Mathews in June 2007. A validation course is planned for spring 2008 with the first pilot to be conducted late summer 2008 to support 94th Army Air and Missile Defense Command personnel rotations.

The Tactical Space Operations Course

By LTC Bob Guerriero, Robert N. Zaza and William T. Coffey Jr.

Since December 2005, the Directorate of Combat Development (DCD) has conducted a Tactical Space Operations Course. This course grew from the DCD and Space and Missile Defense Battle Lab recognition that Space and Missile Defense Command needed to train the newly formed Space Support Elements, which were then being fielded for the first time in modular Division headquarters. At the time, the goal of this relatively informal course was to increase Space Support Element's combat effectiveness in the areas of Effects, Force Protection and Battle Command for their supported forces. The Tactical Space Operations Course has since evolved to prepare deploying Army Space Forces to plan, integrate and coordinate Space support, with a focus on the tactical and operational levels of war in the U.S. Central Command area of responsibility. Over 50 students have been trained in six "pilot" versions of the Tactical Space Operations Course since its inception, including many National Guard Soldiers, Space Support Element members, Army Space Support Team members, contractors and one Air Force Officer.

Recently, DCD has undertaken efforts to revise the content of the Tactical Space Operations Course and formalize the Program of Instruction and lesson plans, with a long-term goal of securing Training and Doctrine Command accreditation and establishing a permanent cadre of instructors. The revised Tactical Space Operations Course is a 40-hour course that will prepare Soldiers to deliver effective, full-spectrum Space support in a tactical or operational environment by providing

The revised Tactical Space Operations Course includes lessons and practical exercises on the following topics:

- Global and Central Command Space Organizations.
- Theater and Global Space Requests
- Precision Engagement and Precision Logistics
- GPS Electromagnetic Interference
- Blue Force Tracking including Personal Locator Beacons
- BFT Integration into the Common Operating Picture
- Space Support from National Technical Means
- Commercial Satellite Imagery
- Overhead Non-imaging Infra Red Sensors and Architecture
- Overhead Non-imaging Infra Red Applications
- Satellite Communications Systems
- Environmental Effects on Satellite Communications
- Satellite Communications Protection
- Enemy Use of Space

training focused on current and emerging tactics, techniques and procedures. The Tactical Space Operations Course's main target audience includes officers and noncommissioned officers in tactical or operational units who have Space operations responsibilities. This includes, but is not limited to, members of Space Support Elements and Army Space Support Teams; Army FA40s; Corps FA40s; and Fires Brigade FA40s. Its secondary target audience includes officers or noncommissioned officers, from any service, with Space operations responsibilities who are preparing to deploy to a combat zone.

The first revised Tactical Space Operations Course was taught in Colorado Springs, Colo., from Jan. 21-25, 2008. Fourteen students attended this course, including the entire 101st AA Division Space Support Element and four Air Force students. The Tactical Space Operations Course will be conducted approximately quarterly in Colorado Springs. DCD has also developed a mobile version of the course, which can be provided at units' home stations when travel to Colorado Springs is not practical. The first Mobile Tactical Space Operations Course was delivered to the 10th Mountain Division Space Support Element at Fort Drum, N.Y., Feb. 4-8. In addition to the Space Support Element, other members of the 10th Mountain Division staff participated in selected portions of the training. Students who want to attend the Tactical Space Operations Course should possess a basic understanding of Space weather, the Space environment and orbital mechanics. Students should also possess a current SECRET security clearance. Though not required, the following courses are recommended before attending: Space Fundamentals Course, Space 200, or the Space Operations Officer Qualification Course. Officers or noncommissioned officers interested in attending the Tactical Space Operations Course should contact the Tactical Space Team.

LTC BOB GUERRIERO has been the Chief of the Tactical Space Team since March 2007. He is an FA40 and graduate of the Command and General Staff College and the Space Operations Officer Qualification Course. He has served in various strategic and tactical Space assignments, including Chief of the Directorate of Combat Development's Capabilities Integration Division, III Corps Space Operations Officer, and within the National Reconnaissance Office. (robert.guerriero@smdc-cs.army.mil)

ROBERT N. ZAZA has been a member of the Tactical Space Team since February 2005. An FA40 LTC in the Army Reserve, he holds the Air Force Senior Space Badge, and has served in various leadership and staff positions, including Combined Joint Task Force-180 Army Space Support Team Leader; S-2, 4th Brigade, 4th Infantry Division; Observer/Controller, 91st Division; Antiterrorism and Force Protection Officer, J2, U.S. Southern Command; and S-2, 5th Battalion, 20th Infantry. He is currently a Senior Space Operations Analyst with CAMBER Corporation. (robert.zaza@smdc-cs.army.mil)

WILLIAM T. COFFEY JR. has been a member of the Tactical Space Team since February 2003 and has served in the Space and Missile Defense Battle Lab since 1993. A retired Army Military Intelligence Officer, he served in various tactical and strategic assignments to include 2nd and 4th Infantry Divisions, V Corps and Northern Command. He served in Iraq and Afghanistan as a Department of the Army Civilian in 2006 conducting assessments of Theater Space Operations. He is currently a Senior Space Operations Analyst with CAMBER Corporation. william.coffey@smdc-cs.army.mil

ARMY TEAMS UP WITH OLYMPIC TRAINING CENTER TO SAVE LIVES

COLORADO SPRINGS, Colo. – April 27, 1944 was an extremely tense and highly stressful time for many Soldiers. Orders had come through that an exercise, named Operation Tiger, was to take place to prepare for a counter offensive that would later be widely know as D-Day.

Photos & Story Michael Kahl
Public Affairs Office

Members of the 1st Space Battalion conduct Water Survival Training at the Olympic Training Center. *Photos by Michael Kahl*

The morning of April 28, Operation Tiger was underway. Everything was going as scheduled until German E-boats on patrol spotted the convoy of eight tank landing ships (LST's) carrying vehicles and combat engineers. The Germans attacked the unsuspecting transports resulting in over 600 casualties. Many service men drowned in the cold sea waters. Soldiers not acclimated to being at sea panicked and put on their life belts incorrectly. In some cases the panicked Soldiers jumped into the water and the weight of the packs flipped them onto their backs, pushing their heads underwater and drowning them. Operation Tiger would bring about the realization that water survival training was of extreme importance in the field. The relevance to learn such training was now more important than ever.

The need for this training still proves to be vital for Soldiers during the present wartime. Although the climate of Iraq is mostly dessert, there are portions of the country that can incur heavy flooding from the Tigris and Euphrates Rivers, and since the start of the war, a number of American Soldiers have drowned in the canals that run through Baghdad.

According to CPT Erich Atkins, the 1st Space Battalion S-4, "We lost three Soldiers to drowning when I was in Baghdad with the 3rd ACR, and it was because they couldn't get their equipment off in time."

These tragedies made Atkins realize the importance of water survival training for Soldiers, especially the ones in his battalion. As luck would have it, Atkins ran into an old friend from high school, Jeanine DeSalvatore, who just happened to be the chief of aquatics at the Olympic Training Center here. After some reminiscing on old times, DeSalvatore and Atkins came up with the idea of the battalion conducting water survival training at the Olympic Training Center. The original plan was for members of the Olympic swim team to be there for the training, but due to schedule conflicts they were unable to attend. Atkins proposed the training to his battalion commander, LTC Tom James and CSM James Ross, and was given the go ahead to conduct the training.

"The main objective for Lieutenant Colonel James was to build esprit de corps," said Atkins. "He wanted us to get Soldiers in the water, to get them into a situation that they're not in normally, and to have some fun learning. It was not supposed to be if you don't complete this you fail. He does want us to get up to a level where we have some proficiency, but for now this was the first step in building a relationship with the Olympic Training Center and also having our Soldiers realize swimming is important as well as just a fun thing to do."

The training, which was conducted on Nov. 30, consisted of a 50 meter swim with and without uniform, survival swimming, and remedial swimming; however, swimming in general was new to a few individuals who had never

BUILDING ESPRIT DE CORPS

been in the water.

"The one stipulation we did have was you will get into the water," added Atkins.

Everyone had to get in the water, some with flotation devices, and at least hold onto the side of the pool. As the non-swimmers got more comfortable toward the end, some were out trying to do some water treading and what they renamed the survival float.

"It is no longer called the dead man's float. That didn't really go over very well, so now it is the survival float," Atkins said with a laugh

The S.A.F.E. principle, a method to counter the tendency to panic in the water, was taught to the Soldiers during the training. This reminds a Soldier to use Slow easy movements, Apply natural buoyancy, have Full lung inflation and be Extremely relaxed. Each step remembered assists the Soldier and increases the chance for survival in a dangerous situation.

Other portions of the training taught the Soldiers how to remove their MOLLE vest once they hit the water. This training highlighted the importance of hitting the water in a survival mode. "It was a lot easier this time because there were no plates in the vests, but generally speaking, the weight of a vest with plates is about 35 pounds, so if you don't get it off, you're going to tire quickly and go under," said Atkins.

The Soldiers also had to create a flotation device out of the pants of their Army Combat Uniform. This was accomplished by removing the bottoms, tying them together, putting them around their neck and filling them with air bubbles.

After the training was finished, those interested competed to see who could swim the farthest underwater. According to Atkins, "it happened to be Staff Sergeant Tidd who is a former Marine, so that was kind of funny. He was like, 'we didn't do too much swimming in the Marines,' but it just happened to work out that he was a Marine and he ended up swimming the furthest and got a four-day pass and a sergeants major coin."

"The overall training went well so we're planning another one for the springtime, and this time we're going to step it up a little bit with more equipment and events," added Atkins. "We also identified a few people we want to send to lifeguard school, so this was actually an added benefit."

Although the Olympic swimmers could not be there for this event, they have expressed interest in participating in future training. "We can get them some Army uniforms and we can do the survival swim test with them, that way they can see exactly what we're doing and then maybe they can race somebody and win by a lot," Atkins said laughingly.

"Seriously, this is something we are trying to work and this is a great initial step to establishing a good relationship between the Army and the Olympic Training Center, two groups that represent America all over the world."

SUCCESSFUL FLIGHT

TEST PROVES MISSILE DEFENSE ABILITIES

REST EASY AMERICA ... YOU ARE DEFENDED IN ALL ELEMENTS

By SGT Michael Cost
100th Missile Defense Brigade (GMD)

VANDENBERG AIR FORCE BASE, CALIF. — Americans lay their heads down at night with the comfort that he/she/they will continue to wake up the next morning, and in most cases, this is true. Protecting a family from a home invasion is generally done with a firearm which is easy to obtain and use. What could an American citizen use to defend against an Intercontinental Ballistic Missile flying through Space at their hometown threatening not just their home but entire neighborhoods and cities? The 100th Missile Defense Brigade (Ground-based Midcourse Defense) has this angle covered … and the system works.

The Department of Defense has instituted a system to "hit a bullet with a bullet" in Space while the average American sleeps, goes to work or plays with their children. Ground-based Midcourse Ballistic Missile Defense is coming of age, as a recent strenuous test of the system proved.

On Sept. 28, the 100th Missile Defense Brigade and the Missile Defense Agency tested one of their Ground-based Interceptors against a missile launched from Kodiak, Alaska. The Ground-based Interceptor launched from the test pad located here and hit pay dirt several hundred miles off the coast of California during yet another successful test launch.

A strong breeze blew in from the ocean as the countdown over the radios began … some were concerned over foul weather reports out of Kodiak. Once the countdown reached under 10 seconds, all doubts were pushed aside … 10, 9, 8, 7, 6, 5, 4 and a giant stream of fire forced itself out of the in-ground silo on the coast of California.

A rumble of the earth and through a thick cloud of smoke the Ground-based Interceptor protruded almost slowly, but within no time was on its path to success. Cameras clicked and cheers came from the crowd as the missile being put to the test pierced the sky towards its target … it was well on its way now — moving so fast it was hard to keep in camera viewfinders.

Minutes ticked by, with observers looking to the sky as if they actually expected (hoped) to see the impact hundreds of miles up. Then … Missile Defense Agency contractors start cheering loudly, signaling … MISSION SUCCESS!!!

None of this would be possible without the dedication of the U.S. Army

Soldiers and a multitude of contractors manning the system put in place as a sequel to President Ronald Reagan's "Star Wars" program.

"For that day and several days afterwards, myself and my fellow crew members felt like we were walking on air," said SFC Richard Mach, Future Operations Officer on Charlie Crew 100th Missile Defense Brigade. "These tests continually prove to the warfighters (operators) that this system works and continues to advance."

BG Stuart Pike, Colorado National Guard Deputy Adjutant General for Space, recently took his position after serving with Special Forces for several years. He was given a tour of the 100th Missile Defense Brigade's facilities here to get a clearer picture of how this city-saving system and its components work.

Wires upon wires kept so clean that every time a person stepped foot into any room … a doormat-sized sticky mat removed any dust or dirt so that no destructors could penetrate. Each room is loud due to the massive amount

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of mainframe computers … so much so that briefings to the general must be close quartered however well articulated. The general moved from room to room, building to building.

The Missile assembly building is a massive structure that can be seen from miles away. This is where the contractors really come into play. Although not extraordinary in their size, these missiles contain so much advanced technology that a person has to remove all jewelry and badges before even entering the facility. An average man, who turns out to have a wealth of information inside of his head, briefed the general on how these ground-breaking missiles are assembled, and the tour continued.

Standing outside a "clamshell" (where the silo splits the ground and the Ground-based Interceptor proceeds on its mission- see photo bottom right) was the last stop for the newly appointed Space Deputy Adjutant General. Below him stood a $50 million piece of equipment ready and waiting to be launched against any Intercontinental Ballistic Missile launched at North America.

"It's a missile in a hole," said CWO Barri Buehre, Systems Integrator for the 100th Missile Defense Brigade. Soldiers, Sailors, Coastguardsmen, Airmen and Marines stand ready to defend our nation, on the land, air or sea … but who protects it from Space? Technology is gaining ground fast and the United States military is keeping ahead of the times. Tried and true, the system put in place to protect our nation from an Intercontinental Ballistic Missile attack stands locked and loaded — ready to defend. Rest easy America.

AIR FORCE SPACE BADGE AWARDED TO ARMY SOLDIERS

PETERSON AIR FORCE BASE, — Feb. 22, 2008

The Air Force approved the Army criteria for award and wear of the Air Force Space Badge (AFSB) at the Basic, Senior, and Master levels to Army Space Cadre members who meet the rigorous qualification criteria of training/education and experience gained while serving in validated Army Space Cadre positions. On Aug. 22, 2006, the Chief of Staff of the Army approved the acceptance and wear of the Air Force Space Badge on Army uniforms. The commanding general, U.S. Army Space and Missile Defense Command/Army Forces Strategic Command was designated as the approving authority within the limits specified by the Air Force for those applying for the badge.

MAJ William Sherratt III receives the Air Force Space Badge certificate from COL Michael Maloney.

On Dec. 19, three SMDC/ARSTRAT Soldiers who met the proper criteria for the badge were awarded the Basic Air Force Space Badge. SPC Ruben G. Villanueva, MAJ William E. Sherratt III and MAJ Craig W. Cox were pinned with their awards in a ceremony here in SMDC/ARSTRAT's operational headquarters in Building 3. Villanueva and Cox are part of SMDC/ARSTRAT's G-3 Operations division, and Sherratt is with the Integrated Air and Missile Defense section of the G3. The three Army Soldiers now not only work on an Air Force Base but share in the wearing of a badge from one of their sister Services.

By SGT Christopher R. Crook
JTAGS Japan, 1st Space Company

JTAGS MISAWA

MISAWA AIR BASE, Japan — It was like a scene right out of the latest action-adventure movie. Teaser: Your mission, should you choose to accept it is to setup a Joint Tactical Ground Station (JTAGS) site. Your equipment: A C-17 Globemaster aircraft, a JTAGS shelter with all its equipment, and nine determined Soldiers from the 1st Space Company, 1st Space Battalion (two officers, six JTAGS operators, and one acting supply noncommissioned officer.) Your final destination is Misawa Air Base, Japan. As author Clive Cussler would say, "Now make like an egg

Dissolve to: It all began on a quiet September evening in Colorado Springs. The setup crew of nine hand-selected JTAGS personnel anxiously waited on the flight line, at Peterson Air Force Base, with almost 90,000 pounds of equipment standing by. Shortly after 7 p.m., the high-pitched howl of a C-17 on approach broke the silence.

Soldiers lined up at the fence to watch their chariot taxi in off the runway. She was a big, ugly beast, but an impressive one at that. The flight crew was certainly not the least bit reserved about bragging on her behalf. She had just rolled off the assembly line less than two years ago, and was referred to as the "latest model." Very fitting for what was about to take place.

As the JTAGS crew began the equipment upload, they realized right away that the task at hand looked a lot easier on paper. However, with a few minor deviations, the help of a 60K loader (aka, the Optimus Prime of forklifts), and some guidance from the loadmasters, everything fell right into place, and their precious cargo was securely stowed for the next day's flight. The upload had been a success. Cut to: Next day in the afternoon.

The JTAGS crews bid their goodbye's to families, coworkers, and other members of the 1st Space Battalion and 1st Space Brigade before loading onto the aircraft for what would hopefully be an adventure worthy of another "Iron Eagle" movie sequel.

The engines fired up, the ground crew gave a "thumbs up," and the tower cleared the aircraft for takeoff. But much to the surprise of the Soldiers on board, however, the plane didn't takeoff with the nice and easy acceleration of most commercial flights, carefully calculated and executed to keep passengers from spilling their latte's. Instead, the pilots performed the good ole "Top Gun" takeoff that snatched the JTAGS crews' collective heads sideways and sent books and iPods sailing into the back of the plane.

If they weren't awake before, they definitely were now. Luckily for the crew, the chains holding down the MTV (Medium Tactical Vehicle) held tight. Other than the rocky takeoff, the flight went pretty smooth. A refuel in Washington state, an overnighter at Elmendorf Air Force Base (home of the F-22's), and an 8-hour flight over the Pacific pretty much summed it all up.

Scene and country change: Upon landing at Misawa, the JTAGS crews stepped off the huge cargo aircraft to see a very familiar face. It was CPT Stephen K. Jennison, the JTAGS Detachment Commander, Japan who had been waiting with as much eager anticipation as the Soldiers had.

So, what does all this mean? It means that a JTAGS unit from the U.S. to Japan is the culmination of a four-year cooperative effort between U.S. Pacific Command, U.S. Space Command, U.S. Forces Japan, U.S. Strategic Command and U.S. Army Space and Missile Defense Command/Army Forces Strategic Command.

CW3 Santiago Gonzales carefully eyeballs the loading of the JTAGS shelter onto a C-17 Globemaster aircraft at Peterson Air Force Base for a trip to its new home at Misawa Air Base, Japan in early September. *Photo by DJ Montoya*

Misawa was selected for its ability to support operations, Soldiers and their families.

The presence of JTAGS in Japan provides a more robust Theater Ballistic Missile Defense and Ballistic Missile Warning Capability. Its mission is to receive and process in-theater direct down-linked data from Defense Support Program (DSP) sensors in order to disseminate warning, alerting and cueing information on ballistic missiles throughout the theater using existing communication networks.What the Soldiers from the 1st Space Company were about to accomplish

was historical. Not just because it was a new site, or due to the fact that they would be the first newly deployed JTAGS in over five years, but because what was off-loaded at Misawa Air Base on this incredible afternoon was the legendary (and what was once thought to be lost) "Shelter #1."

It was the original JTAGS Tactical System. The fabled "Shelter #1" was built for U.S. European Command, pulled mission in U.S. Central Command, and eventually became the test system and fielding shelter for Northrop Grumman, at Fort Carson, Colo. Now, after months of reconstruction, she had ventured halfway around the world, to what should become her final site, to once again assume her vital mission.

"I must say, she certainly turned heads as we drove across Misawa Air Base (due mostly in part to the fact that an enormous MTV towing a 10-ton shelter, driven by Army Soldiers, is not a common sight around these parts,)" said Jennison.

Cut to the happy ending or is it the beginning: Once the JTAGS Soldiers arrived, they could see that the new compound was quite impressive. The shelter fit perfectly in its new bay, the antennas had an eight-foot mound carved perfectly out of earth and grass to sit atop, and the offices came to look pretty sharp after a few weeks of nearly round-the-clock construction.

Setting up the site was no easy task, but then again every new initiative has some growing pains to endure. They now had their home, shelter and only two weeks to make her gleam like a rock star.

LEFT: JTAGS Japan 1st Crew along with their Commander, CPT Stephen Jennison (far left back row) celebrate after a successful set up of the facility on Misawa Air Base, Japan. *Photo courtesy JTAGS Japan*

RIGHT: Three TACSTAR antennas herald the arrival of the Joint Tactical Ground Station in Japan. The mission of JTAGS is to receive and process in-theater direct down-linked data from Defense Support Program (DSP) sensors in order to disseminate warning, alerting, and cueing information on ballistic missiles throughout the theater using existing communication networks. *Photo courtesy JTAGS Japan*

The next two months were just a matter of training the JTAGS Soldiers who had come to take the place of the original set-up crews who had invested in massive amounts of caffeine for their 12-hour shifts.

There were laughs and heartaches, and more than enough long hours. Some of the original JTAGS personnel returned home early after the initial job was done, but a few stayed behind to ensure that the mission could continue, and that the new crews were fully capable of doing the job. But for all of them it had been an experience.

End titles: The original nine included 1LT Corey Ruckdeschel, Chief Warrant Officer 3 Santiago Gonzales, SSG Jonas Moody, SSG Jared English, SGT Christopher Crook, SGT Patrick Contreras, SGT Michael Scott, SGT Ivan Virruet and SPC Robert Parshall.

It was 5,600 miles, a month of construction, 24-hour operations between two crews, and enough issues to start a new magazine line.

Army SPC John Dempsey, SFC Cody Dorman demonstrate a response to a simulated missile launch at the Joint Tactical Ground Station here on Jan. 22, 2008. JTAGS is operated by approximately 24 people, 24 hours a day, seven days a week. *U.S. Air Force photo by Airman 1st Class Eric Harris*

MISAWA

JTAGS Misawa sees "launch"

By Master Sgt. Allison Day, 35th Fighter Wing Public Affairs

MISAWA AIR BASE, Japan — In a history-making event Tuesday at 2:30 p.m., the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command deputy commanding general cut a red ribbon at the wing's newest facility, as the Joint Tactical Ground Station marked its official opening here.

The ceremony, led by Army BG John E. Seward from SMDC/ARSTRAT on Peterson Air Force Base in Colorado Springs, Colo., gave attendees an opportunity to find out exactly what JTAGS is all about.

"The presence of JTAGS in Japan provides a more robust theater ballistic missile defense and ballistic warning capability and joins three other JTAGS units located around the world," said Seward. "Misawa was chosen for the location of the unit because it provides the best location for this mission as well as a good quality-of-life for our Soldiers. The Japanese community is a welcoming and supportive civilian environment for our Soldiers and their families."

BG John E. Seward and Koji Haneda, Ministry of Foreign Affairs, Tokyo, cut the ribbon for the official opening of JTAGS Misawa on Jan. 22, 2008. (U.S. Air Force photo by Airman 1st Class Eric Harris)

Although this JTAGS is the second system to be located in the Pacific Command, it is the first to be located in Japan. Guests at the ceremony included civic leaders from Misawa, Tokyo and surrounding areas and Japan Air Self Defense leaders. Masses of Japanese and American reporters were on hand to capture the event.

"JTAGS receives infrared data directly from the Defense Support Program satellites and Soldiers operating the JTAGS receive and process the data from the satellite sensors to warn and alert U.S. and Allied commanders," said Army Sgt. 1st Class Steven Adams, 1st Space Brigade training and evaluations noncommissioned officer to the crowd.

System operators were also on hand to provide a simulation of what occurs when they detect the launch of a theater ballistic missile. "Once a missile launch is detected, it is verified and all allied and U.S. forces are notified of an incoming threat," said SFC Cody Dorman, JTAGS operations crew chief. "We're also able to determine the impact time of the missile."

JTAGS is an around-the-clock operation. "I trust with the activation of this detachment, we will not only develop a stronger partnership, but will also increase the trust and friendship of our Japanese allies," said Seward. "This unit stands as a symbol of our two nations' long-standing security cooperation and commitment to peace and stability in this region."

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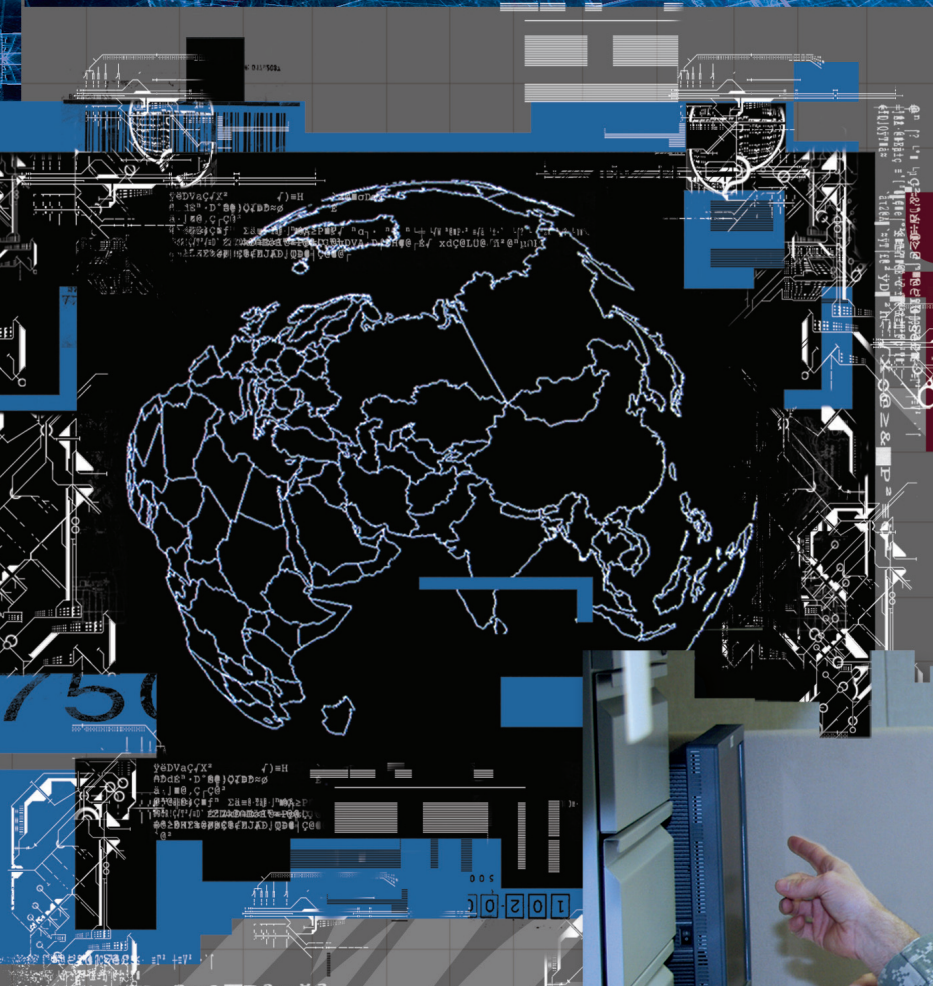
JTAGS ON THE MOVE