



**PRECISION STRIKE
ASSOCIATION**

Affiliate, National Defense
Industrial Association

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**"Dedicated to advancing the art and science of
precision engagement concepts and technology"**

VISION STATEMENT

We aspire to be the premier association dedicated to advancing the art and science of precision engagement concepts and technology.

To accomplish this, we will promote the development of systems and procedures in order to locate, fix, track, target, and attack fixed, moving, and relocatable targets.

We recognize that battlespace management, the network within which it functions, and the adjunct command and control requirements are crucial to success on the battlefield.

PSA has a global perspective and welcomes international participation.

Army Secretary Francis Harvey, Air Force Secretary Michael Wynne and USSTRATCOM's Lt Gen Bob Kehler, USAF to Keynote PSTS-06

The Precision Strike Association (PSA) is very enthusiastic about the extremely powerful program it has planned for its 16th Precision Strike Technology Symposium (PSTS-06) scheduled for 17-19 October at the JHU APL Kossiakoff Center in Laurel, MD.

PSTS-06 will be conducted at the SECRET/NOFORN level all three days. (Focus areas and a listing of key executive-level speakers are highlighted on page 15.)

Effective Global Strike demands innovative thinking and a process that can identify, examine, and turn technology or concepts into capabilities on the battlefield. With a focus on *Capabilities Required for Global Strike—Technology Implications for the Future*, PSTS-06 will continue to provide a forum for top industry leaders and military decision-makers on the latest advances in next-generation technologies and platforms by exchanging insights, experiences, and ideas for precision strike systems.

PSA takes pride in featuring three distinguished speakers who will keynote PSTS-06. Their career highlights are reflected below.

USAF Lt Gen Bob Kehler will address PSTS-06 on opening day. He is

the Deputy Commander, United States Strategic Command. As second in command, he is charged with ensuring that USSTRATCOM meets responsibilities for global command and control of strategic forces and remains ready to provide strategic assets to execute decisive national security objectives. Lt Gen Kehler has had a broad range of operational and command tours in ICBM operations, space launch, space operations, missile warning and space control.

Following graduation from Pennsylvania State University in 1974, the General entered the Air Force as a distinguished graduate of the Air Force ROTC program. General Kehler holds a M.S. Degree in Public Administration from the University of Oklahoma and a M.A. Degree in National Security and



Francis J. Harvey



Michael W. Wynne



Lt Gen C. Robert Kehler, USAF

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Chairman's Column

Changing of the Guard

It is with a great deal of humility that I take up the position of Chairman of the Board of the Precision Strike Association (PSA). We are dedicated to advancing the art and science of precision engagement so that our soldiers, sailors, marines, and airmen and those of our coalition partners will be successful on the battlefield. Members of PSA, government and industry around the globe, represent an important resource in securing our nation's objectives of securing a safe and free world.

Wayne Savage will be a difficult act to follow! He enabled PSA to achieve some very significant milestones, including our affiliation with the National Defense Industrial Association, while promoting a much broader view of precision engagement.

To the Board of Directors: Thanks for your vote of confidence in my election as your Chairman. I look forward to working with you and the other members of the Executive Committee in pursuit of our goals for the precision strike community. As we all know, the machinery of PSA keeps running smoothly because of the great work by the Committee Chairs and their members as well as by Paul Greenberg, our Executive Director and Dawn Campbell, Director of Operations. I'm excited about the things Paul, Dawn, and I have already talked about instituting for PSA.

PSA brings value to the community. Sponsoring and organizing industry events have become a big commercial business. PSA is not in the business to sell event registrations, exhibit space, or industry sponsorships. PSA events have only one goal: to

provide government and industry a forum to exchange ideas that will further our vision.

We do not generate profit. Our budget for any event covers only fixed and variable costs. For this reason, you get the maximum value from the funds set aside by your organization for conferences and symposia. And we strive to keep our registration fees as low as possible.

The Kill Chain frames our professional focus. PSA has its roots in strategic precision strike weapons, such as the early Tomahawk cruise missile. As operational doctrine and technology advanced, precision effects on the battlefield became desirable at all levels of warfare, theater, operational, and tactical.

The long war to defeat global terrorism has put an even greater premium on precision effects. PSA must continue to evolve as the concepts and capabilities to create precision effects do so as well.

We look to bring into the PSA family many of the disciplines that are oriented toward capabilities in the information domain—those that provide battlespace awareness and knowledge to make the Kill Chain function.

We welcome and encourage PSA membership of those companies, with an information age focus and an interest in precision engagement.

Our military forces face the daunting task of continuing to transform their capabilities from platform-centric operations to network-centric operations.

The changes in culture and the investment of resources required to transform are unprecedented. We live in interesting times. I hope you are also excited about PSA's role in meeting these challenges.

Bill Dalecky

2006 Precision Strike PEO Forum Wrapup

The Precision Strike Association (PSA) conducted the 2006 edition of its very popular Precision Strike Program Executive Officers' (PEO) Forum on 25-26 July 2006 at the San Diego Marriott Hotel and Marina.

This year's theme *Integrated Joint Battlespace Management—Creating Desired Effects on the Battlefield* brought together both senior level decision makers and experienced subject matter experts from DoD and industry to examine and discuss the uses of precision weapons on the dynamic battlefield.

The event was held in the hometown of the U.S. Navy's Space & Naval Warfare Systems Command (COMSPAWAR). The symposium co-hosted by the local National Defense Industrial Association (NDIA) chapter proved to be a great success with 175 attendees.

USN Rear Admiral Michael C. Bachmann, commander, Space & Naval Warfare Systems Command, welcomed the forum participants to San Diego.

He said "the role of C4ISR (command, control, communications, and countermeasures/intelligence, surveillance and reconnaissance) has always been necessary to the Carrier Strike Group Commander. But it has not been an essential part of the sensor-to-shooter equation. But that situation is rapidly changing as the capability begins to merge into the new concepts of network centric warfare and time critical strike.

"This is why it is now termed C5ISR with the fifth "C" standing for combat systems. This, in recognition of the fact that the two areas are rapidly becoming a single tool available to the warfighter.

"This is a very exciting time to be in this business. Change is coming very quickly with the warfighter the winner," Bachmann has concluded.

Keynote speakers for this two-day forum included the Honorable Kenneth J. Krieg, under secretary of defense for acquisition, technology and logistics (USD/AT&L).

Mr. Krieg addressed the PEO Forum on opening day. He shared his vision for improving the defense acquisition process, including highlighting challenges to streamline the entire kill chain.

His six goals as the Pentagon's architect for acquisition, technology and logistics matters are:

- retention of high performing, agile and ethical workers as the 'baby boomers' retire
- strategic and tactical acquisition excellence
- focused technology to meet the warfighter's needs
- cost-effective joint logistics support for the warfighter ("supply chain as offense")
- reliable and cost effective industrial capabilities sufficient to meet strategic objectives, which includes attracting more non-traditional defense companies
- and, improving the government's decision processes.

Stated Krieg: "In front of us there is a world of strategic choices that are very relative to us. The challenge is what to do about it. We must look at the 'effects' base, and try and figure out how to make the 'trades' while understanding how to

optimize the effect—not the individual program."

He said not all weapons programs get funded in a budget-constrained environment. To the U.S. military services, Mr. Krieg said: "Fund your priorities, terminate the lower ones so you can actually create capability. It's an output/outcome question, not an input question."

Mr. Krieg is responsible for advising the Secretary and Deputy Secretary of Defense on all matters relating to the DoD Acquisition System-R&D, advanced technology, developmental T&E, production, logistics, installation management, military construction, procurement, environmental security and NCB matters.

Next up on the podium was USN RADM Timothy Heely, program executive officer for strike weapons and unmanned aviation, who spoke on integrated joint battlespace management-creating desired effects on the battlefield.

RADM Heely explored the joint warfighting arena, discussing the Joint Surface Warfare (SuW) Advanced Concept Technology Demonstration (ACTD) and the Global Hawk Maritime Demonstration (GHMD). He also reviewed naval experience with the Boeing/Insitu ScanEagle tactical unmanned aerial vehicle.

The Joint SuW concept involves multiple interchangeable ISR assets targeting multiple weapons.

In March, the USN's first Northrop Grumman Global Hawk unmanned air system (UAS), N-1, arrived at the Naval Air Station,



Honorable Kenneth J. Krieg

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Wrapup, Continued from page 3

Patuxent River, MD—one of two RQ-4A aircraft that the Navy has acquired through the GHMD project.

The GHMD N-1 aircraft, to be operated by test squadron VX-20, will be used to develop Navy concepts of operations, and tactics, techniques, and procedures for persistent ISR.

Clayton V. Davis, a staff specialist in USD (AT&L), leads his organization's review of land attack weapons (LAW). The review is assessing the efficiencies of joint developments and procurements, and will be a critical link to production of future smart weapons roadmaps. His Capability Area Review (CAR) will provide an overall context and understanding of land attack weapons, including the Joint Air-to-Surface Standoff Missile (JASSM).

Davis said the LAW CAR process has been a good communications tool with lots of diverse focus areas being reviewed. He said those involved continue to investigate opportunities for improving the weapons portfolio.

The Service Precision Requirements & Programs Panel on day one was moderated by Aerojet's Anthony Ammendolia, who also served as the Precision Strike PEO Forum Event Chairman.

Representing the U.S. Army on the panel was Sammy Coffman, director of the Fort Sill Futures Development & Integration Center (FDIC), who spoke about ongoing efforts to transform U.S. Army indirect fires.

He said the lack of precision of today's indirect fires weaponry precludes use in most urban engagements because of the probability of collateral damage, and too many munitions are needed to achieve the desired effects. He added that the development of precision guidance kits for indirect fire weapons is improving warfighter capabilities. The Army, he said, "is not only working on precision, but precision that limits collateral damage."

As director of the Air-to-Ground Munitions Systems Wing, Eglin AFB, FL, Thomas J. Robillard is responsible for the latest USAF precision weapons, including the Joint Direct Attack Munition (JDAM), Small Diameter Bomb (SDB) and JASSM-ER (Extended Range). He updated the PEO Forum attendees on the USAF's portfolio of key air-to-ground projects.

USN CAPT Richard "Rhett" Butler, deputy commander of Carrier Air Wing 14, offered a 'real world' appraisal of the Navy's precision weaponry, having just returned from a deployment aboard the USS Ronald Reagan (CVN-76)—her first combat deployment in support of joint and coalition operations in the Middle East region.

His Boeing F/A-18 strike aircraft used JDAM, Laser Maverick and laser guided bombs to "deter and disrupt."



PSA's Chairman Bill Dalecky recognizes Wayne Savage, past chairman, for his work.

Butler said sensors aboard the Hornets were able to spot improvised explosive devices (IEDs) on the side of the road, saving the lives of ground forces.

The first day of the Precision Strike PEO Forum concluded with a VIP tour of the USS Ronald Reagan (see article on page 14) followed by a poolside reception at the San Diego Marriott Hotel & Marina, offering both relaxation and networking opportunities.

The second and concluding day of the Precision Strike PEO Forum got underway early with USAF Lt Col Phil Darcy, commander of the 17th Weapons Squadron, USAF Weapons School, Nellis AFB, NV, briefing on current precision strike targeting, training, tactics and testing.

Darcy discussed the evolution of precise targeting from Operation Allied Force (OAF) to Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Current test efforts involve the GBU-39 SDB, which offers increased weapons load out and reduced collateral damage. He said the Air Force's arsenal of precision weapons offers speed and accuracy while reducing the logistics footprint.

Darcy believes the standard conventional load can be reduced with: deployment of a dual mode weapon (GPS with laser terminal guidance);

See **Wrapup**, Continued on page 5

Precision Strike Association

would like to thank the
following 2006 PEO Forum
Exhibitors & Sponsors

- Boeing**
- Sargent Fletcher**
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- Lockheed Martin**
- MBDA**
- Northrop Grumman**
- Raytheon**
- Ultra Electronics**

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enhanced multi-targeting capability; and, increased capability to hit moving targets. He is also a firm believer in advanced targeting pods.

The Unmanned Combat Air Systems (UCAS) Panel provided a status report on the DoD's revamped effort to field next-generation armed unmanned aerial systems and a long-range strike capability. The panel was chaired by Boeing's Max Norgart and included: Dyke Weatherington, deputy, OSD UAV Planning Task Force, OUSD (AT&L); USN CDR Marty Deppe, deputy program manager, Navy UCAS; Northrop Grumman's Rick Ludwig and Boeing's Rod Lekey.

The Pentagon's spending plan for Fiscal Year 2007 reflects the intentions of the Quadrennial Defense Review (QDR), which among other things calls for an increase in special operations forces, accelerated procurement of unmanned aerial systems, and development of a new long-range strike platform.

The USAF's FY07 budget request establishes a dedicated special operations forces (SOF) unmanned aerial vehicle (UAV) squadron at Creech AFB, NV initially with 24 MQ-1 Predator drones. Creation of the SOF UAV unit is part of the Pentagon's plan to increase procure-



PSA Chairman Bill Dalecky addresses PEO Forum attendees

ment of UAVs, including Predators and Global Hawks, to "nearly double" UAV coverage.

The Joint Unmanned Combat Air System (J-UCAS) program was terminated, with the Navy embarking on its own carrier-based unmanned combat air vehicle effort. Navy spending on UCAS would total \$1.83 billion in FY07-11. In March 2007, the Navy plans to select either Boeing or Northrop Grumman to demonstrate the feasibility of UCAS carrier compatibility in the 2011/12 timeframe.

The QDR calls for development of a new land-based, penetrating long-range strike capability (either manned, unmanned or optionally manned) to be fielded by 2018, about the time that a naval UCAS would achieve initial operational capability.

USN CAPT David Dunaway (PMA-201) anchored the Kill

Chain Panel with support from USN CAPT Chris Sprinkle, USN LT CDR Nicole Shue, Jack Granger, Wayne Willhite and USN CDR Ed "Ski" Wolski. They discussed horizontal integration of the Kill Chain from their own perspectives.

PSA's Paul Greenberg chaired the Precision Weapons Command and Control panel, which offered details on ongoing C&C efforts, such as the Tactical Targeting Network Technology (TTNT) and the Affordable Moving Surface Target Engagement (AMSTE) programs. The Panelists included DARPA's USAF Lt Col Stephen Waller and the Air Combat Command's Colonel Thomas Wozniak, USAF.

Daniel Radke, the chief test engineer at NAVAIR-Point Mugu, CA, offered a history lesson on precision strike weapons testing at his facility, saying that "understanding our technical heritage helps provide lessons learned to solve tomorrow's problems. With future advances...we'll be able to more quickly and accurately strike high value time critical targets."

The PEO Forum concluded with a presentation by Chris Seat of General Atomics Aeronautical Systems Inc. who discussed Predator precision weapons integration and testing. ■

Precision Strike PEO Forum Exhibitors



Cobham-Sargent Fletcher Exhibit



MBDA Exhibit



Ultra Electronics Exhibit

Exhibitor space for PSTS-06 is now available—see www.precisionstrike.org for more details.



- 1 RADM Michael C. Bachmann, USN, Commander, SPAWAR
- 2 Chris Seat, Director, USAF Predator Programs ASG, GA-ASI
- 3 Lt Col Phil Darcy, USAF, Cdr. 17th Weapons Sq., USAF Weapons School, Nellis, AFB
- 4 Clay Davis, Office of the USD (AT&L)
- 5 Daniel Radke, Chief Test Engineer, NAVAIR-Point Mugu, CA
- 6 RADM Timothy Heely, USN, PEO Strike Weapons and Unmanned Aviation



- 7 (l to r) Precision Weapons Command and Control Panel: Lt Col Stephen Waller, USAF; Chair: MG Paul Greenberg, USA (Ret); Colonel Thomas Wozniak, USAF
- 8 (l to r) PSA's Ginny Sniegou, Ken Krieg, USD (AT&L) and PSA's Bill Dalecky
- 9 (l to r) Service Precision Requirements & Programs Panel: Moderator: Tony Ammendolia (also 2006 PEO Forum Event Chairman); USN: CAPT Richard "Rhett" Butler, Deputy Commander Carrier Air Wing 14; USA: Sammy Coffman, Director, Fort Sill Futures Development and Integration Center; USAF: Tom Robillard, Director, Air to Ground Systems Wing
- 10 (l to r) UCAS Development Vision Panel: Chair: Max Norgart, Boeing; Rod Lekey, Boeing; Dyke Weatherington, Deputy, OSD UAV Planning Task Force, OUSD (AT&L); CDR Marty Deppe, USN, Deputy PM, UCAS-D; Rick Ludwig, Northrop Grumman
- 11 (l to r) Kill Chain Panel: Moderator: CAPT David Dunaway, USN (PMA-201); CDR Ed Wolski, USN; LT CDR Nicole Shue, USN; Jack Granger, PM Operations Department, CMSA LANT; Wayne Willhite, Naval Air Warfare Center, China Lake; CAPT Chris Sprinkle, USN



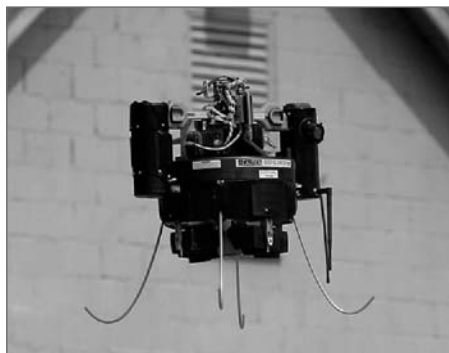
U.S. Army to Test FCS at Fort Bliss

To further the development of the Future Combat Systems (FCS) program, the Army is designating a combat unit to evaluate and test cutting-edge technology.

The Evaluation Brigade Combat Team "EBCT", which will begin forming in March 2007, will be stationed at Fort Bliss, TX. Fort Bliss was selected to host the EBCT because of its immense training areas and proximity to White Sands Missile Range and Biggs Army Airfield.

The EBCT is an essential part of getting the FCS in place. Three brigade combat teams are scheduled to move to Fort Bliss from Europe as part of the Base Realignment and Closure process. One team will be designated as the EBCT.

The EBCT will start with about 819 soldiers and eventually grow to full BCT size of 3,500. These soldiers will evaluate in a real-time environment the technologies in the FCS program.



DARPA's Micro Air Vehicle will be tested at Fort Bliss

The FCS program consists of a family of 18 manned and unmanned systems connected by a common network. Through this network, soldiers and leaders will be linked to leading-edge technologies and capabilities that are critical to risk reduction in combat. The technologies will allow soldiers to maneuver quickly and conduct a variety of missions in complex environments.

The first round of equipment will be delivered to the EBCT in 2008. As more FCS technologies become available, they will be delivered to the EBCT for evaluation and testing. There will be four such deliveries in total, implemented in two-year cycles.

The EBCT will continue testing FCS equipment and technologies until 2016. The Army plans to transition the EBCT into the first brigade combat team fully equipped with FCS equipment.

As the EBCT tests equipment, the unit's soldiers will provide feedback on the equipment's performance. Through this feedback, the Army will be able to determine what, if any, adjustments or improvements are needed to continuously develop the equipment. After the equipment is tested by the EBCT, it will be fielded to the operational Army. The first unit is expected to receive EBCT technology in 2014. ■

USAF Introduces Next Generation Cruise Missile

Since the late 1970s, the U.S. Department of Defense (DoD) has tried and failed numerous times to field an affordable standoff cruise missile capable of taking out the enemy's air defenses early on in a conflict.

Fast forward to 2006 and that warfighter need has finally been met by the U.S. Air Force's next generation cruise missile – the Joint Air-to-Surface Standoff Missile (JASSM) made by Lockheed Martin.

At 14 feet long and 2,250 pounds, JASSM is an autonomous, conventional munition with a standoff range of more than 200 nautical miles. The stealthy cruise missile is

designed to defeat heavily defended, high-priority enemy targets deep behind enemy lines.

JASSM can be released in virtually any type of weather and uses its inertial navigation and Global Positioning Systems to find its intended target before employing its infrared seeker for pinpoint accuracy just before impact.

Warfighter's operational need

For years, the warfighters have emphasized the need for an affordable standoff weapon they could use to attack high-priority targets from outside the enemy's air defenses.



JASSM gives USAF a lift

This weapon would give both fighter and bomber aircraft the ability to strike heavily defended and high-value targets in any weather and keep them out of harm's way.

The last attempt to try and provide this capability was the Tri-Service

See **Cruise Missile**, Cont. on page 8

Cruise Missile, Cont. from page 7
Standoff Attack Missile (TSSAM). But after eight years of development, the Secretary of Defense terminated the program because of problems with the weapon and escalating costs. However, the warfighter's need for the weapon still remained, so the DoD went back to the drawing board.

The newly christened JASSM program office was charged with not only making a high survivability standoff weapon capable of attacking various types of targets, but also one made with speed and affordability in the acquisition world. They partnered with DoD, industry and the warfighter to streamline many processes that were often timely and cumbersome before; they emphasized affordability at every juncture.

Testing challenges

Even though the JASSM program office had set a solid foundation for their weapon and knew what pitfalls to avoid, that didn't mean the road to handing the weapon to the warfighter would be easy or without struggles.

The weapon began engineering and manufacturing development in 1997 and entered low rate initial production just four years later in 2001. Then the next important step for JASSM came in July 2004 when it reached full rate production.

However, even as JASSM continued to hit milestones some challenges remained.

"Achieving demonstrated in-flight reliability turned out to be our biggest challenge in the transition from development to full rate production," said USAF Col. Jim Geurts, who manages the program as the Long Range Missile Systems Group (LRMSG) commander.

"To address these challenges, we pulled together the experts from across industry and the DoD to review our plans and give us feedback to ensure we could achieve the type of reliability growth needed as we began fielding large numbers of assets in the field," Colonel Geurts said.

Their hard work paid off and the JASSM team went back to prove the weapon could deliver on its promise. During flight tests in 2005 the weapon scored nine successes in 11 tests, followed by two more successful flights in 2006.

On the heels of those successes, the weapon finished the year strong, reaching initial operational capability on the B-52 Stratofortress and B-1B Lancer. More than 350 JASSMs have been delivered. They are in the hands of the warfighter—ready for combat worldwide.

"The JASSM weapon system continues to demonstrate high reliability in flight and ground testing," said USAF Maj. Gen. Jack J. Catton Jr., director of requirements for Air Combat Command. "More and more units are gaining the capability to effectively employ the weapon system."

Future capabilities

While JASSM has proven itself, the LRMSG has plans to make it even more lethal.

The second phase of the program is to make an extended range version of the weapon. JASSM-ER will increase the standoff capability to more than 500 nautical miles. The weapon, which looks exactly the same as the original from the outside, has a new engine and can carry more fuel. It will first be integrated on the B-1B.

"A JASSM-ER will have the same lethality and stealth as a JASSM, but it will deliver that knock-out

punch from more than twice as far away," said USAF Lt. Col. Stephen Davis, JASSM Block 2 Squadron commander. "In the simplest terms, this means some child's mom or dad won't have to fly their B-1 through enemy threats to strike many deeply placed targets."

But additional standoff range isn't the only thing they are improving. The LRMSG is also adding a weapons data link that will enable key command and control elements to communicate with the weapon after it's already in flight.

"The data link will plug the weapon right into the warfighting network," said Michele Brazel, LRMSG deputy director. "They'll be able to track what each missile is doing in flight, retarget it in flight if need be, and then get a good indication of whether or not it destroyed its target."

JASSM is also scheduled to be one of the first weapons to be Universal Armament Interface compliant. UAI is a joint initiative that will allow the Air Force to incorporate new precision-guided munitions onto its aircraft without requiring major changes to each aircraft's software.

New development activity is also planned to enable JASSM to enhance its maritime engagement capability and become the air-launched weapon of choice not only for highly defended fixed and relocatable land targets, but moving maritime targets as well.

And recently the Australian Defense Force selected JASSM to be its long-range air-to-surface missile for their F/A-18 Hornet fleet.

As it stands right now the Air Force currently plans to buy 2,400 JASSMs and 2,500 JASSM-ERs with production extending through 2018. ■

SDB Joins the Fight

Boeing in late May delivered the first production Small Diameter Bomb I (SDB I) System to the USAF.



SDB now arms Strike Eagle

The SDB I weapon system, which includes a four-bomb capacity carriage, is the first of a new generation of weapons whose small size and robust performance greatly increase the mission capability of current and future platforms. It also is the first of more than 24,000 such weapons and 2,000 carriages the Boeing SDB team will manufacture for the Air

Force. The Air Force is investing \$1.2 billion for production of the system, with deliveries planned beyond 2015.

During development, Boeing successfully tested 39 SDBs against a variety of fixed targets, hitting each target within less than four feet of its surveyed aimpoint.

The all-weather SDB I weapon system is compatible with every U.S. fighter and bomber aircraft. It has a standoff range of 60 nautical miles. At 71 inches long, this 250-pound class weapon quadruples the number of weapons each aircraft can carry.

Four F-15E Strike Eagles, each loaded with small-diameter bombs, known as guided bomb units, in July completed the first operational training mission with the new munition.

494th Fighter Squadron aircrews tested the capability of the GBU-39,



SDB shows its stuff

using training munitions. "Our four-ship formation hit 16 targets with 16 bombs in one pass," said Lt. Col. Will Reese, 494th Fighter Squadron commander. "In Operation Desert Storm, you could expect one plane loaded with six bombs to destroy one target. Now, we can use one bomb per target and each aircraft can carry up to 16 bombs," Reese added.

The 494th Fighter Squadron deploys in September to support operations Enduring Freedom and Iraqi Freedom. ■

Tomcat: End of an Era

Two strike fighter squadrons arrived at Naval Air Station Oceana in mid-March, ending a six-month deployment and closing the book on the Tomcat as an asset in the Navy's war fighting arsenal.

The "Tomcatters" of Strike Fighter Squadron 31 and the "Black Lions" of Strike Fighter Squadron 213 were deployed with Carrier Air Wing 8 embarked on the aircraft carrier USS Theodore Roosevelt.

The squadrons' "fly-off" marked the last operational flight of the F-14D Tomcat and the final stage of the squadrons' transition to the F/A-18 E/F Super Hornet. VF-213 pilots began F/A-18F training in April and VF-31 pilots, who are transitioning

to the F/A-18E, will remain operational with the Tomcat only through September.

The Navy decided to decommission the Tomcat and move to the Super Hornet to lighten the workload on its people after recognizing the excessive amount of maintenance needed to keep them operational.

"It takes about three to four times more maintenance man-hours per flight hour to maintain the Tomcat than the newer Hornet. Retiring the extremely relevant but maintenance intensive Tomcat was a way to save the exhaustive efforts of our people and better spend their labors," said



F-14 Tomcat goes into retirement

Cmdr. Richard LaBranche, VF-31 commanding officer.

"I will miss flying the Tomcat very much," LaBranche said. "Saying good bye to the Tomcat will be like saying good bye to an old friend, but

See **Tomcat**, Cont. on page 10

Tomcat, Cont. from page 9

in the best interest of our people, it must be done.”

Throughout its 32-year service to the fleet, the Tomcat has been synonymous with excellence. Since the first aircraft entered operational service in September 1974, the Grumman-built F-14 has seen numerous upgrades

and modifications. “It is one of the greatest fighter planes in history,” Lt. Chris Rattigan, a pilot with VF-31, said. “When you think of naval aviation, you think of the Tomcat.”

The Tomcat saw its first major improvements to the initial design with the F-14B, introduced in November 1987, which incorporated new General Electric F-110 engines.

In 1995, an upgrade program brought the Tomcat new digital avionics and weapon system improvements.

While deployed, VF-31 provided invaluable close-air support to troops on the ground and, together with VF-213, completed 1,163 combat sorties totaling 6,876 flight hours. ■

Skyguard Pitched for Counter-MANPADs

Northrop Grumman has formally proposed a ground-based, high-energy laser system, Skyguard, as part of a layered airport defense against the man-portable air defense systems (MANPADs) threat to commercial aviation.

The company submitted its proposal to the Department of Homeland Security, which is conducting an assessment program to evaluate and demonstrate emerging technology solutions that prove to be the most mature and promising in defeating the MANPAD threats to commercial aviation.



Skyguard offers defensive shield against air threats

“Northrop Grumman is developing a range of approaches to provide a layered defense for airport security,” said Alexis Livanos, president of Northrop Grumman’s Space Technology sector. “We already offered the aircraft-based Directional Infrared

Countermeasure (DIRCM) system, which the Department of Homeland Security is currently evaluating, in addition to the ground-based, high-energy laser system we now propose.”

In the near-term, DIRCM can be installed on the most vulnerable aircraft. As the threat of attack continues to increase and new, more capable types of threat systems are introduced, a layered defense can substantially help mitigate the danger to commercial aviation.

Skyguard uses a high-energy laser to physically destroy a wide range of anti-aircraft threats in the airport region, even with very short launch ranges, according to Mike McVey, Northrop Grumman’s vice president of directed energy systems. Skyguard can be available in less than two years once a contract is received at approximately \$30 million for each system.

Based on the Tactical High Energy Laser (THEL) testbed at White Sands Missile Range, NM, Skyguard has the specific capabilities needed to defeat supersonic threats, including speed-of-light operation, extreme precision, proven lethality and demonstrated operational safety, according to McVey. He noted that THEL has shot down dozens of rockets in flight since 2000, including 122mm Katyusha rockets, short-range



Skyguard in the mix to protect civil airliners

ballistic missiles, artillery and several calibers of mortars.

Compatible with a range of packaging options, the Skyguard laser system would be placed at or near an airport to detect, track and destroy a variety of threats. This capability will handle a full range of infrared seeker systems, and also is uniquely effective against command-guided missiles, McVey added.

Northrop Grumman says Skyguard can also be used to defend against short-range ballistic missiles, short- and long-range rockets, artillery shells, mortars, unmanned aerial vehicles and cruise missiles.

A single Skyguard system can defend deployed forces, a large military installation, and/or a large civilian population or industrial area. One Skyguard system is capable of generating a protective shield of about 10 kilometers in diameter. ■

News Briefs

ABL Laser Light Show

A Boeing-led industry team and the U.S. Missile Defense Agency (MDA) in June took a major step toward demonstrating the capability of the Airborne Laser (ABL) by successfully firing surrogate lasers from inside the aircraft.

During recent ground tests at Boeing facilities in Wichita, KS, the team placed the lasers in the ABL aircraft, a modified Boeing 747-400F, and fired them repeatedly into a measuring device called a range simulator. The tests verified that the ABL team properly aligned the optical beam train, a series of optical components, steering and deformable mirrors, and sensors that will guide lasers to an actual target. The equipment exercised in the tests is part of the beam control/fire control system designed and integrated by Lockheed Martin.

The lasers used in the tests were low-power surrogates for ABL's high-energy laser and two illuminator lasers. The program plans to install actual illuminators in the jet for ground and flight tests later this year. The track illuminator laser is designed to track all classes of hostile ballistic missiles. The beacon illuminator laser will measure atmospheric conditions, allowing the beam control/fire control system to compensate for atmospheric turbulence in the high-energy laser's path to a target. During this year's flight tests, the illuminators will be fired in flight at a missile-shaped image painted on a test aircraft.

Also in June, the industry team successfully conducted an ABL ground test demonstrating the weapon's ability to track and target a ballistic missile. The ABL located a

simulated boosting ballistic missile target created by a target simulator.

The high-energy laser, which achieved lethal power and run-times in a ground laboratory in December 2005, is currently being refurbished and will be installed in the ABL aircraft in 2007 to prepare for the program's first missile shoot-down test, slated for 2008. ■

BAE Systems to Demonstrate Precision Guidance Cannon Artillery

BAE Systems has received a six-month contract from the U.S. Army's Project Manager, Combat Ammunition Systems to participate in a competitive technical development program for the Precision Guidance Kit for use with Army cannon artillery ammunition.

The guidance kit is a low-cost system that will improve the accuracy of conventional 105 mm and 155 mm artillery projectiles. ■

ATK Wins DSU-33C/B Proximity Sensor Contract

Alliant Techsystems has received a \$5.5 million contract from the USAF for an initial production run of DSU-33C/B proximity sensors and five production options. If all options are exercised, the total value of the multi-year contract award could exceed \$38 million.

The contract and options extend ATK's DSU-33C/B production program through 2011. The DSU-33C/B proximity sensor is essential to the missions of numerous general-purpose bombs such as the Mk 80 series, and M117. In addition, it is used frequently in variants of the Joint Direct Attack Munition (JDAM).

The DSU-33C/B is an all weather, battery-powered device capable of

operating in electronic countermeasure environments. It completed qualification testing in 2005 and entered production in January 2006. ATK has produced more than 52,000 DSU-33 variants since production began in 2000. ■

AARGM CDR Completed

The AARGM international government – industry team has successfully completed the Critical Design Review (CDR) of the AGM-88E Advanced Anti-Radiation Guided Missile (AARGM).

The CDR was the first major review attended by the Italian Air Force since signing a Memorandum of Agreement with the U.S. Department of Defense to participate in AARGM development. Once in production, the Italian government is expected to procure approximately 250 AARGM systems in addition to the 1,750 systems to be procured by the U.S. Navy/Marine Corps.

The CDR provided an opportunity for the government/industry team to demonstrate the extent of its progress since successfully completing the Preliminary Design Review in April 2005.

AARGM is a supersonic, air-launched tactical missile compatible with U.S. and allied F/A-18, EA-6B, Joint Strike Fighter, F-16 CJ, and Tornado IDS/ECR aircraft. Its multi-sensor system design (including an advanced digital Anti-Radiation Homing (ARH) receiver and conformal array antenna system, a Millimeter Wave (MMW) terminal seeker and a GPS/INS) is capable of selectively engaging a variety of time-sensitive strike targets in addition to enemy air defense targets.

AARGM is network-enabled and

See **News Briefs**, Continued on page 12

News Briefs, Continued from page 11 will provide near real-time Weapon Impact Assessments (WIA) to support joint force commanders. AARGM, the next iteration in the highly successful AGM-88 series weapons, is a Department of the Navy major acquisition program under Program Executive Office, Strike Weapons & Unmanned Aviation (PEO(W)). ■

F-22 Scores Direct Hit in Supersonic, High-Altitude JDAM Drop

The U.S. Air Force successfully demonstrated the F-22 Raptor's ability to release a munition at supersonic speed, high altitude and standoff range during a recent joint developmental and operational test at White Sands Missile Range, NM.

An F-22 fighter, flying at a speed of Mach 1.5 and an altitude of 50,000 feet, released a GPS-aided, 1,000-pound Joint Direct Attack Munition (JDAM) from a range of 24 nautical miles, destroying a ground target in the aircraft's fastest and highest JDAM delivery to date. The ability to release a munition at supersonic speeds and standoff ranges greatly enhances the aircrew's survivability against heavily defended targets.

Success of the standoff delivery is due in part to the Raptor avionics' ability to compute an accurate Launch Acceptability Region (LAR), the area in the sky from which the pilot can release a weapon to successfully attack the desired target.

The LAR supersonic algorithm factors in navigation, weather, target and weapon information.

A B-1B Lancer struck a Taliban-associated compound May 17 near Kandahar, Afghanistan, in support of coalition ground forces. The bomber destroyed the compound. Coalition ground forces reported approximately 15 to 20 Taliban were killed from the air strike.

It was the first use of a GBU-38 JDAM by a B-1B in a combat environment. The USAF recently added a new software package to the bomber

that allows it to carry and deliver this guided weapon.

Meanwhile, Boeing in June successfully tested its Laser Joint Direct Attack Munition (LJDAM) weapon system against a moving target.

During the test at Eglin AFB, FL, a F-16 flying at 20,000 feet scored a direct hit on an Armored Personnel Carrier (APC) moving at 25 mph. Using its onboard targeting

pod, the F-16 laser-designated the APC and released the 500-pound LJDAM approximately four miles from the target.

The Laser JDAM sensor is a modular kit that is easily installed in the field to the front of existing JDAM weapons. The laser sensor further enhances the highly capable Global Positioning System/Inertial Navigation System JDAM. Boeing will complete its development of the 500-pound LJDAM in 2006. Initial production deliveries are planned to begin as early as 2007. ■



USAF F-22A Raptor refuels in flight

Enhanced Paveway II Data Link

Raytheon has successfully shown that its Enhanced Paveway II dual-mode GPS/laser guided bomb can be retargeted in flight using a data link, providing the ability to engage moving targets in bad weather.

Two Enhanced Paveway IIs were dropped from a UK Royal Air Force (RAF) Tornado GR4 aircraft. Each weapon was twice updated in flight with new target coordinates, and the precision guided munitions accepted the retargeting coordinates and successfully flew to their new final targets.

The tests, which were conducted by the RAF's Fast Jet and Weapons Operational Evaluation Unit, marked the first successful demonstration of air-to-ground weapons receiving updated target coordinates after release. The update information can be sent to the weapon by ground-based or airborne forces. ■

Zarqawi Air Strike Shows Precision

The U.S. Air Force's latest contribution to the ongoing war on terrorism took center stage June 7 when an air strike against a safe house north of Baghdad killed terrorist leader Abu Musab al-Zarqawi, head of al-Qaida in Iraq.



Still photo of the air strike on the building housing Abu Musab al-Zarqawi

Two F-16Cs dropped two precision-guided 500-pound bombs, a GBU-12 laser-guided bomb and a GBU-38 Joint Direct Attack

See **News Briefs,** Continued on page 13

News Briefs, Continued from page 12
Munition (JDAM), on the safe house, killing Zarqawi and his spiritual adviser.

The F-16 did not rely on people on the ground pointing a laser at the house. Rather, the aircraft "lased" the target from the air. ■

Marotta's New M-PACT for IR Missile Seeker Cooling

Marotta Controls has been selected by the U.S. Navy to build high-pressure pneumatic Pure Air Generating Systems for integration into the LAU-7 and LAU-127 missile rail launchers using its proprietary Pure Air Compression Technology, M-PACT. The contract, valued at nearly \$14 million,

includes qualification, production, test, engineering and technical support services.

The LAU-7 and LAU-127 rail launchers, which provide the electronic and mechanical interfaces between the missiles and the launch aircraft, are used to employ various missiles from a variety of tactical aircraft. Marotta's M-PACT will supply the high-pressure compressed air required to achieve on-board cryogenic cooling of the infrared missile seeker head. ■

Contract for Intelligent Munitions System for U.S. Army

Textron Systems has been awarded a \$115 million U.S. Army contract for the system design and development phase of the Intelligent Munitions System (IMS) program.

A core component of the Army's Future Combat System initiative, IMS is a revolutionary networked sensor and munition system that brings unprecedented situational awareness and terrain control to the battlefield.

Low-rate initial production of IMS is scheduled to start in 2008; delivery is scheduled for 2010. Textron Systems' teaming partners include Northrop Grumman, ITT Industries and BAE Systems. ■

PMTD Achieves Autonomous Flight

The Boeing Persistent Munition Technology Demonstrator (PMTD), a test bed for future unmanned aerial vehicles (UAVs), flew autonomously for the first time during a test in April at Vandalia Municipal Airport, IL.

Boeing developed the 60-pound PMTD to demonstrate emerging technologies through incremental upgrades and flight demonstration phases. With a wingspan of 12 feet, the vehicle's airframe is designed for extended loiter times, air or surface launch and other potential capabilities.

During the test, the PMTD navigated to 14 programmed locations flawlessly, changed altitudes at four different points and achieved pre-planned speeds. ■

CALENDAR OF EVENTS

Precision Strike Technology Symposium

Date: October 17-19, 2006

Theme: "Capabilities Required for Global Strike—Technology Implications for the Future"

Location: The Johns Hopkins University Applied Physics Laboratory, Kossiakoff Center, Laurel, MD

Precision Strike Winter Roundtable

Date: February 1, 2007

Theme: "Precision Engagement—Strategic Context for the Long War"

Location: Crystal Forum—Crystal City Marriott, Arlington VA

Precision Strike Annual Programs Review

Date: April 24-25, 2007

Theme: "TBD"

Location: Waterford Receptions of Springfield—Springfield, VA

Sponsorship and exhibit opportunities available for all events. More information can be found at www.precisionstrike.org



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PEO Forum Attendees Visit USS Ronald Reagan

Over 70 attendees of the Precision Strike PEO Forum held 25-26 July in San Diego toured the U.S. Navy's most powerful aircraft carriers—USS Ronald Reagan (CVN-76).

The Ronald Reagan recently returned from her first combat deployment in support of joint and coalition operations in the Middle East region. The visitors were hosted

by crewmembers and welcomed on board by USN CAPT “Rhett” Butler, deputy commander of Carrier Air Wing 14. CAG 14 was embarked on the Ronald Reagan, executing combat sorties. USN CAPT “Spud” Conroy, air operations officer, Ronald Reagan Strike Group, was the senior member of the staff providing the tour.

CAG 14 was smaller than in previous carrier battle group deployments to the theater, reflecting the increased capability of the carrier air wing to provide air-to-ground support with precision munitions.

The F/A-18 Hornets and Super Hornets flew missions that were routinely as long as six hours in duration. Typical weapons load-outs included a full range

of laser-guided bombs, Joint Direct Attack Munitions (JDAMs), and Maverick Missiles. Electro-optical (EO) and infra-red (IR) sensors provided terminal guidance for some of the weapons while JDAM operated as designed with autonomous GPS guidance.

In keeping with the theme of the Forum *Integrated Joint Battlespace Management—Creating Desired Effects on the Battlefield* the attendees were particularly interested in mission planning and Kill Chain management. The Joint Mission Planning System was used as the standard planning tool prior to launch. Aircraft were routinely assigned tasking only after arriving on station. Such requirements reinforced the need for industry to think about how to more effectively and efficiently get Kill Chain data into the cockpit of airborne aircraft in order to strike time sensitive targets. ■



Boarding the USS Ronald Reagan

PSTS-06, Continued from page 1
Strategic Studies from the Naval War College.

The Honorable Francis J. Harvey will bring the precision strike community up to speed on the U.S. Army's transformation initiatives during his keynote address on the second day of PSTS-06. Dr. Harvey was sworn in as the 19th Secretary of the Army in November 2004. He has statutory responsibility for all matters relating to Army weapons systems and equipment acquisition, manpower, personnel, Reserve affairs, installations, and environmental issues. Secretary Harvey's number one priority is the well being of soldiers

and their families. He has traveled extensively to visit soldiers worldwide.

Secretary Harvey earned his B.S. in Metallurgical Engineering and Material Science from the University of Notre Dame and his Doctorate in Metallurgy and Material Sciences from the University of Pennsylvania.

The closing day of PSTS-06 will feature the Honorable Michael W. Wynne who is the Secretary of the Air Force. Secretary Wynne's responsibilities include organizing, training, equipping and providing for the welfare of nearly 370,000 service members. Prior to his current position, he served as the Principal Deputy Under Secretary of Defense for

Acquisition, Technology and Logistics.

Secretary Wynne graduated from the U.S. Military Academy and served in the USAF as an assistant professor of astronautics at the U.S. Air Force Academy. Additionally, he holds a M.S. in Electrical Engineering from the Air Force Institute of Technology and a M.S. in Business from the University of Colorado.

Please join these distinguished defense visionaries as well as key dynamic warfighters and technology experts who will address this informative and exciting symposium that is widely credited as the best technology symposium of its kind! ■

Schedule at a Glance

PRECISION STRIKE TECHNOLOGY SYMPOSIUM (PSTS-06)

17-19 OCTOBER 2006

The Johns Hopkins University Applied Physics Lab • Kossiakoff Center • Laurel, MD

Capabilities Required for Global Strike-Technology Implications for the Future

Confirmed Keynote & Executive-level Speakers:

Honorable Francis J. Harvey—Secretary of the Army
 Honorable Michael W. Wynne—Secretary of the Air Force
 Lieutenant General C. Robert “Bob” Kehler, USAF—Dep. Commander, USSTRATCOM
 Major General Michael A. Vane, USA—Vice Director for J-8, The Joint Staff
 John Landon—DASD for C3ISR and IT Acquisition, OSD
 Steve Henry—Deputy Assistant to the Secretary of Defense for Nuclear Matters
 Lieutenant General Thomas G. McInerney, USAF (Ret)—Fox News Military Analyst
 Brigadier General Andrew Dichter, USAF—DD for Joint Integration, Headquarters USAF
 Brigadier General (Sel) Mark O. Schissler, USAF—DD for War on Terrorism (J-5)
 Jim Tedeschi—Director, Center for Countermeasures, White Sands, NM
 John Liebsch—Director, Future Warfare Systems Office, NGA
 Dave Stein—Director, Strike Policy & Integration for DASD Forces Policy, OUSD(Policy)

PSTS-06 Presentation Topics:

- Top U.S. Military Capability Gaps
- The Long War
- End Game for Global War on Terror
- Prompt Global Strike Capability and Technology Options
- USAF's Global Strike Operational Concept & Requirements
- Global Strike Acquisitions—All the Parts
- Long-Range Strike Weapons
- Sensor & Weapon Pairing Technology
- Role of Prompt Global Strike in the 21st Century
- Army Transformation
- Technical Sessions on Targeting, C4ISR, Weapons, and Effects
- Accurate Situational Awareness Across All Domains—Ground, Air, Sea, and Space
- Sensors Forward—Collaborative Sensor Networking for Global Strike
- Nuclear Issues-How they relate to Precision Strike Requirements
- Thermobaric Weapon
- Countermeasures—Joint Mobile Infra-Red Countermeasures Test System
- Future Targeting Perspective
- Warfighters' Requirements Panel—Navy Views on Global Strike & Analysis of Complete Kill Chain and Kill Mechanisms
- Directed Energy Weapons Panel—Government & Industry Perspectives

PSTS-06 will be conducted at the SECRET/NOFORN level all 3 days

In the next Issue *Wrapup on Precision Strike Technology Symposium 2006*

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